The International Journal of
Orthodontia, Oral Surgery and Radiography

(All rights strictly reserved)

VOL. XIII ST. LOUIS, SEPTEMBER, 1927 NO. 9

ORIGINAL ARTICLES

FACIAL MEASUREMENTS IN DIAGNOSIS*

BY GEORGE G. CAMPION, L.D.S., LONDON, ENGLAND

WHETHER or not we can agree upon a definition of orthodontics, we may probably all admit that the subject is directly or indirectly concerned with the normal growth and functioning of the masticating face, with its abnormalities, their causes, and, so far as lies in our power, with their correction.

Orthodontics as an art has, during the past quarter century, made great strides; but orthodontics as a science has not made the same pace, and the urgent problem from the scientific point of view is to find some method (1) Of investigating in further detail and in the living subject the growth of the masticating face, and (2) Of applying to the examination and treatment of individual cases such knowledge of the growth of the face as we may acquire. This will be a step to an adequate diagnosis and to a classification which shall have at least some reference to etiology.

We know that form and function are interdependent, and the masticating face presents us with an admirable example of the theory of the functioning of balanced groups of muscles, which was formulated by the great French orthopedic surgeon, Jacques Delpech. His observations led him to the conclusion that the forms assumed by the different limbs are the result of the balanced action of opposed groups of muscles, and that if this balance be upset deformity results. Clubfoot is one example of this, and it may well be that in disordered dental arches we have another. In this region one of the opposed muscular groups consists of those entering into the elastic and contractile curtain which we call the lips and cheeks, and the other consists of those which we know collectively as the tongue. The form and size of the dental arches are partly, at any rate, the result of the reciprocal functioning of these two groups. The tongue muscles press the teeth outwards, the lip and cheek muscles press them inwards, and between these two contending

*Read at the Congress of the European Orthodontological Society.

forces the dental arches have in the long course of man's phylogenetic history come to take on the forms which are now characteristic of them.

It would seem that orthodontics as a science must follow the lead of anthropology and become a quantitative study. Anthropology has developed into anthropometry, and the immediate problem before us is to apply anthropometric methods to the growth of the face, and to the elucidation of the problems which confront us in diagnosing and treating its abnormalities. We need correlated quantitative determinations of both the form and functioning power of different types of face, and to think that we can make a science of orthodontics by devoting ourselves, with whatever exactitude, to the dental arches alone, is like thinking we can learn a new language when we know only a quarter of its alphabet. Mr. Friel's admirable work with dynamometers gives us the means of acquiring one of these series of data, and the facial measurements now being made by the Dental Research Committee will in due time give us the other. We shall, when this work has been done, be in possession of quantitative norms both of form and functioning power for different types of face. These we shall be able to apply to individual cases of abnormality, and ascertain the sites and conditions of abnormal growth as a guide both in diagnosis and prognosis.

It follows inevitably from these considerations that in any quantitative study of growth the results of anthropometric investigations on skulls must be complemented by investigations on the living face, and this involves a series of measurements which must be to some extent comparable with those which can be made on skulls, but which in the differing conditions cannot be exactly the same. The researches of Franké, Keith, Brash and others have carried us a long step towards a more complete knowledge of the method of growth of the face, and one of our immediate needs is to find a method of making similarly complete and complementary investigations on living subjects.

Fig. 1 shows diagrammatically on a skull the measurements which I have been using for some few years on the living face, and a preliminary series of measurements on a more extended scale, and including also measurements of the dental arches, depth of palate, etc., is now being made by the Research Committee.

In Fig. 1. A = nasion to subnasal point. B = nasion to incisive margins of maxillary central incisors. C = nasion to the tip of the palatine cusp of maxillary first molars. D = nasion to submental point. E = incisive margin of mandibular central incisors to the submental point. F = transmeatal axis to nasion. G = transmeatal axis to incisive margins of maxillary central incisors. H = transmeatal axis to mental prominence.

In the succeeding tables of figures P = the depth of palate, but no norms of this measurement are at present available. These measurements can be made on the living face, and are comparable with those made by Keith, Franké and others on skulls.

Fig. 2 shows the Wallace-Northcroft prosopometer, a modification of an instrument used by craniologists. This is provided with a removable sleeve (shown detached) which enables the knife edge of the measuring point to be

applied at right angles to the ridge of bone when measuring to the mental prominence. This instrument is used for measurements *F, G, H.*

Fig. 3. Calipers provided with removable sleeves for measurements between different points on the face. (*a*) A curved plate to be seated on the nasion for measurements *A, B, C, D.* This curved plate is hinged to the sleeve to enable the calipers to be swung backwards to the upper molars.

The sleeve on the opposite limb of the calipers is provided with (1) an edge applicable at right angles to the margin of the mandible in making measurement *D,* (2) a crossbar for measurement along line *C,* which is taken

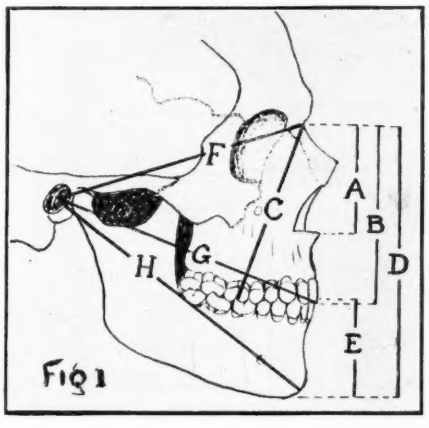


Fig 1

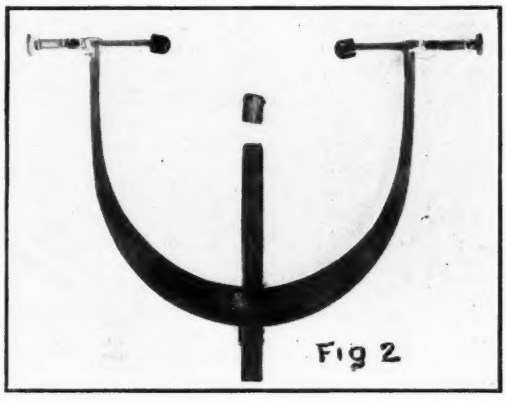


Fig 2

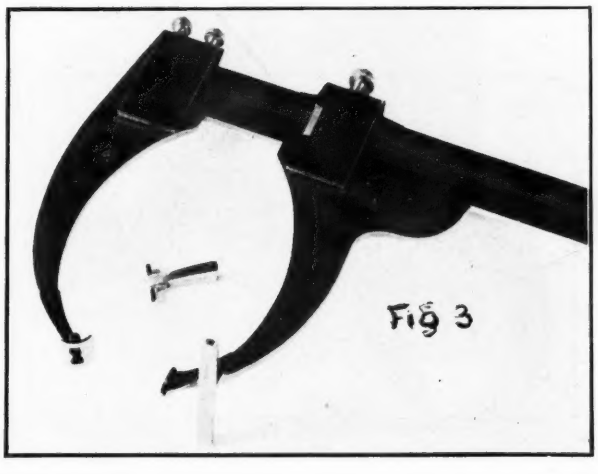


Fig 3

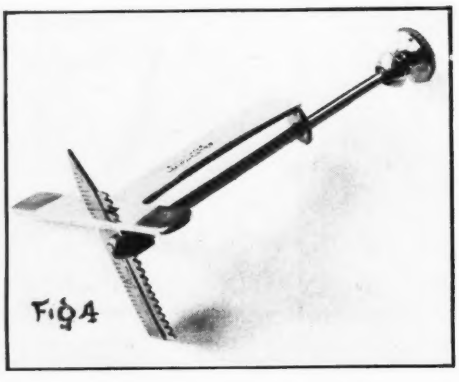
to the tips of the palatal cusps of the maxillary first molars. To facilitate use this bar is placed 1 cm. below the measuring point of the calipers, and this amount is added to the measurement recorded on the scale of the instrument; (3) a third sleeve is shown detached. This is used for taking zygomatic and bigonial measurements of the breadth of the face.

Fig. 4.—An instrument to measure the depth of the palate from the same point as the lower end of the line *C,* viz. the tips of the palatal cusps of the maxillary first molars. Two arms of the instruments are rested on these cusps and the third on the incisor teeth, and the vertical measurement is raised by the rack and pinion until it touches the palate.

Fig. 5.—A smaller pair of calipers for measuring the size of any teeth, breadth of arches and distances from the incisive margins of the mandibular incisors to the submental point. One of its limbs is fitted with a sleeve, enabling a similar measurement to be readily made from the cusps of the mandibular molars to the lower border of the mandible.

By means of these instruments fairly complete measurements can be made of the various dimensions of the masticating face at different ages, and the results grouped into the different year periods and the standard deviation of all the cases calculated.

As the standard deviation, though a valuable and well-known statistical device, has not yet invaded the realm of orthodontics, one may perhaps be excused for explaining how it is arrived at.



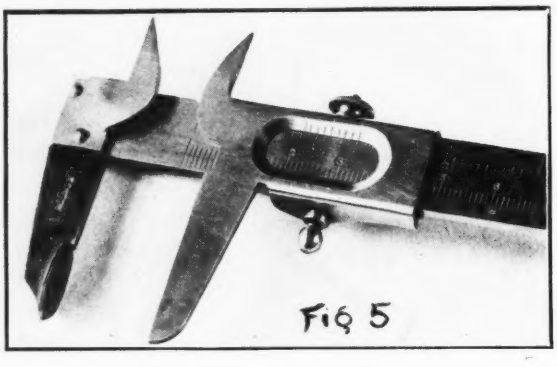


Table I shows this for a series of six measurements of any similar objects; they may be noses, embryos, shells, nuts, etc. The individual measurements are in the first column. The mean or average of this is found and also for each unit of the series its deviation from the mean which may be plus or minus. These individual deviations are squared, as shown in the final column; the mean of the squares is then determined and the square root of this gives the standard deviation. It is an approximate indication of the variation between the several specimens under investigation, and may be used for determining an exact coefficient of variation.

Table II shows the means and standard deviations of all the several dimensions indicated in Fig. 1 for three age groups: 9-11 years, 15-16 years,

and adult. The number of cases in each group is far too small, being only 10, 9, 10 for the three groups, but the cases were carefully selected and they suffice for showing the method and its application. To take two instances as examples on line *F* (transmeatal axis to nasion): the standard deviation is 4.1 for the age 9-11 and 3.87 in the adult group showing that there was greater variation in the 9-11 series than in the adults. On the other hand line *H* shows nearly double the variation in the adults than occurred in the children from 9-11.

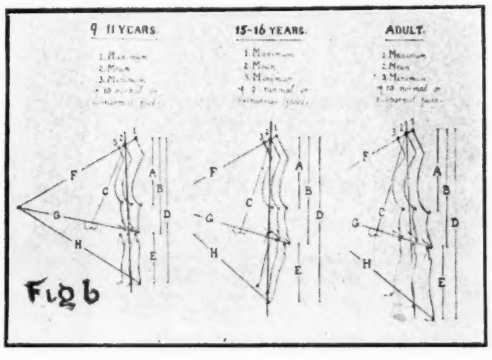


Fig. 6 shows the actual proportionate measurements given in Table II. The deviations shown in figures are here shown in proportionate size and the maximum and minimum in each case is included. They show clearly that the chin grows forward last of all, and that the variation here is the greatest.

Fig. 7 shows in a normal profile the relation of the lips to a line drawn from the tip of the nose to the most prominent part of the chin and also the relation of the nasal orifice to a line drawn between the most prominent points of the forehead and chin. These lines are a great help in detecting abnormal relations between these different parts. The lower lip is seen to be nearer the lip line than the upper.

Fig. 8-*A*, aged 10 years 8 months, shows the profile of a well-known type of abnormality. A short everted upper lip, maxillary incisors impinging on

the lower lip, the vertical face line lies at the posterior margin of the ala nasi; the mandibular dental arch is in this case in postnormal occlusion and the figures show that while the measurements along lines *F* and *G* differ little from the norm or standard of 9-11, that along line *H* has a minus deviation of 8.6.

Fig. 8-*B* shows the table of measurements of the face with the plus and minus deviations from the 9-11 norm. It will be seen that the only two measurements which differ much from the standard or norm are *B* and *H*. The difference between *A* and *B*, which is the distance from the sub-nasal

TABLE I

STANDARD DEVIATION.

	Deviations from Mean.	Deviations squared.
25	− 3·1 (× 3·1 =)	9·61
31	+ 2·9	8·41
28	− 0·1	0·1
30	+ 1·9	3·61
27	− 1·1	1·21
28	− 0·1	0·1
6 | 169		6 | 23·04
28·1 = Mean.		3·84 = Mean.

$\sqrt{3·84} = 1·96$ = Standard Deviation.

MEANS AND STANDARD DEVIATIONS.			
	9–11 YRS.	15–16 YRS.	ADULT
A	42·9 ± 2·55	49·3 ± 2·26	53·2 ± 3·75
B	64·0 ± 2·19	72·6 ± 4·11	76·7 ± 4·56
C	68·1 ± 2·53	75·0 ± 4·3	81·6 ± 4·04
D	100·1 ± 2·6	111·4 ± 5·49	122·8 ± 7·67
E	35·8 ± 1·17	40·8 ± 1·83	44·7 ± 3·34
F	89·9 ± 4·1	95·6 ± 3·16	100·4 ± 3·87
G	86·6 ± 2·97	94·0 ± 4·29	100·6 ± 6·36
H	98·6 ± 3·67	104·3 ± 4·9	119·9 ± 8·65

TABLE II

point to the central incisor margins is 25 mm., while that in the 9-11 norm is 21 mm., but if we allow for the generality of measurements in this face being 1 to 1.5 greater than the norm, we may regard the maxillary incisors as being not 4 mm., but about 2.5 mm. too long. We know that in constructing a denture the raising or lowering of the incisors by an alteration of 2.5 mm. makes a great difference in the appearance of the teeth, and if this be so in the adult how much more so must it be in a child of 10. The other measurement, which differs strikingly from the norm, is that along line *H*, which has a

minus deviation of 8.6, or if we again make allowance for the whole face being slightly greater than the norm, we shall see at once that the mandible is at least 1 cm. too short.

Fig. 8-*C* shows the same face on the same day with the mandible protruded. The vertical line has shifted from the posterior margin of the ala nasi to a position halfway between that and the posterior margin of the nasal orifice. The short everted upper lip has become relatively long and

SB S. 9-11.

Age	10Y8M	+	−
A	44·0	1·1	
B	69·0	5·0	
C	—		
P	16·0		
D	100·0		0·1
E	37·0	1·2	
F	90·0	0·1	
G	88·0	1·4	
H	90·0		8·6

8-*B*

BS S. 9-11.

Age	13Y6M	+	−
A	52·0	9·9	
B	71	7·0	
C	—		
P	18·5		
D	104·0	3·9	
E	40·0	4·2	
F	92·0	2·1	
G	92·0	5·4	
H	93·0		5·6

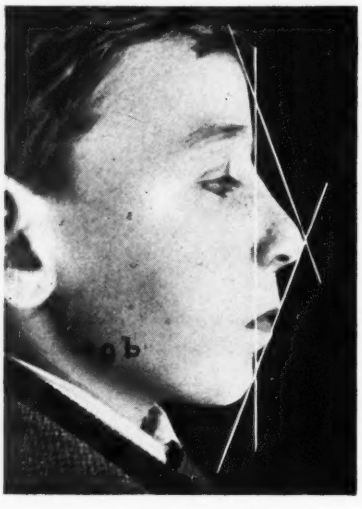
9-*B*

straight and assumed a more normal relation to the lip line, but the lower lip, hypertrophied by years of abnormal impact with the long maxillary incisors and partly perhaps also everted by their abnormal length, has become too prominent and projects in front of the lip line instead of falling behind it.

Fig. 9-*A*.—Profile view of a child aged 13 years 6 months. This is another type of case in which the mandibular arch is in postnormal occlusion and the second mandibular premolars unerupted and the spaces for them half closed. The upper lip is seen to be straight and vertical, but falling in good

relation to the lip line. The lower lip is twice the distance of the upper from the lip line and the labiomental sulcus very pronounced. The vertical face line is halfway between the posterior border of the nasal orifice and the posterior border of the ala nasi. The figures show the measurements along lines *F, G, H,* with the deviations from the 9-11 standard or norm.

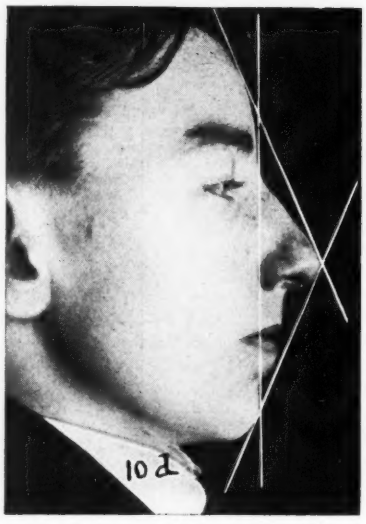
Fig. 9-*B* shows the facial measurements compared with the 9-11 norm. As the child is 13 years 6 months, the figures are with one exception greater



J. C.	S. 15-16.		
Age	12Y 9M	+	−
A	55·0	5·7	
B	78·0	5·4	
C	—		
P	—		
D	113·0	1·6	
E	42·0	1·2	
F	98·0	2·4	
G	99·0	5·0	
H	96·0		8·3

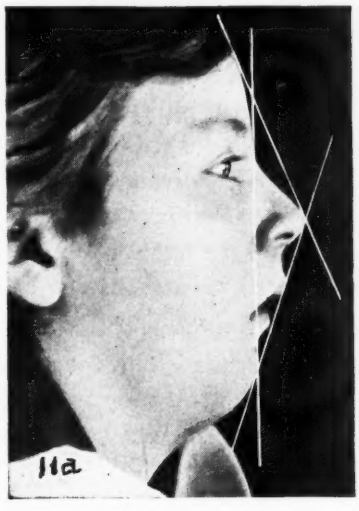
J. C.	S. 15-16.		
Age	15Y 7M	+	−
A	59·0	9·7	
B	85·0	12·4	
C	85·0	10·0	
P	—		
D	128·0	16·6	
E	45·0	4·2	
F	98·0	2·4	
G	98·0	4·0	
H	110·0	5·7	

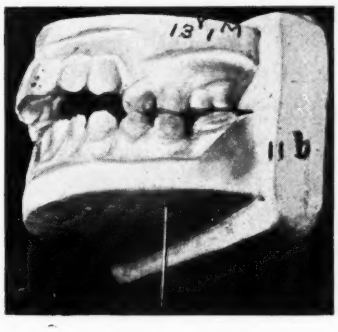
10-*C*



than those of the standard. The line *A* (nose) is relatively long, but the difference between lines *A* and *B,* 19 mm., is 2 mm. less than in the norm, and the length of the incisors from the subnasal point is thus 7 mm. less than in the preceding case, although the child is older and the face larger. It is probably owing to this fact that we find no hypertrophy of the lower lip. On line *G* we find a plus deviation of 5.4 mm., but in view of the fact that on line *F* there is a plus deviation of 2 mm., and in view also of the relatively

large size of the nose, this is probably not as disproportionate as it might at first seem, and to imagine, as one might from examination of the models alone, that the maxillary incisors are protruding, would be an entirely wrong estimate of the case. On line *H* we see a minus deviation of 5.6 mm., although all the others are plus. Here again, taking into consideration the larger size of the face and the age being greater than the norm, the mandible is probably a centimeter too short.





V.L. S. 9-11. V.L. S. 15-16.

Age	10Y 6M	+	−		Age	12Y 11M	+	−
A	46·0	3·1			A	49·0		0·3
B	66·0	2·0			B	70·0		2·6
C	—				C	78·0	3 0	
P	18·0				P	21·0		
D	110·0	9·9			D	117·0	5·6	
E	40·0	4·2			E	41·0	0·2	
F	91·0	1·1			F	93·0		2·6
G	89·0	2·4			G	93·0		1·0
H	99·0	0·4			H	112·0	7·7	

11-*C*

Fig. 9-*C* shows that protrusion of the mandible goes far to correct the profile view, and that expanding the mandibular arch forward and allowing the unerupted premolars to come into position would make it entirely normal.

Fig. 10-*A*.—Here we have a case similar to that shown in Fig. 8. The boy is aged 12 years 9 months, but as his face is large it is compared with the 15-16 norm, and in most dimensions exceeds even this. The upper lip is everted and shows the incisors impinging on the lower lip. The upper lip is just in contact with the lip line. The lower slightly behind it.

Fig. 10-*B* shows the same face with the mandible protruded (photo the same day). The upper lip is now seen to be barely touching the lip line, but the lower has shot beyond it.

Fig. 10-*C* shows the measurements of the face at the ages of 12 years 9 months and also at 15 years 7 months, compared in both cases with the 15-16 norm. The growth in this case has been very great as indicated by the several measurements, many of which exceed those of the adult standard. The most notable are those of the entire length of the masticating face, line *D* which has increased by 15 mm., and that along line *H* when it is 14. In this case the mandible has been brought forward from postnormal to normal occlusion, and this movement has been accompanied by a corresponding increase in growth. The minus deviation of 8.3 mm. at 12 years 9 months has at 15 years 7 months become a plus deviation of 5.7. It would be interesting, but would carry me far beyond the purview of my subject, to discuss the entire figures of this case in their relation to treatment. It must suffice to point out that in these measurements we have a means of observing what growth changes are taking place, and of noting the progress of treatment by them.

Fig. 10-*D* shows the profile at the age of 15 years 7 months, but the lips are closed over the teeth and not as they appear in talking. The teeth then have an appearance of prominence which the measurements show to be due not to their protrusion but to their length. The upper lip is now well behind the lip line, and the lower less so on account of its hypertrophy.

Fig. 11-*A*.—Profile of a case of mordex opertus or open-bite. Age 10 years 6 months.

Fig. 11-*B*.—Models showing the lack of occlusion of the incisors..

Fig. 11-*C*.—Figures of the facial measurements at the ages of 10 years 6 months and 12 years 11 months. This child had adenoids and tonsils removed at the age of 4 years 6 months. She can breathe perfectly through the nose now with the aid of a valve plate. It will be seen that while at the later age the lines *A*, *B* have a minus deviation, line *C* has a plus deviation of 3 which probably accounts entirely for the open bite. The later measurements also show a great increase in the length of the mandible.

In bringing before you these few cases which the facial measurements have enabled us to analyze closely, I beg you to note that they are not rare cases but are examples of some of the different classes of case which confront us daily in practice, and they have afforded us at any rate some striking examples of the possibility of applying anthropometrical methods to orthodontics. It is possible at the moment to present only a meager part of the field which these methods can be made to include within their range in this subject; but before they can throw much light on the variations of facial growth which are open to our investigation we must possess adequate norms of physiologic as distinguished from pathologic growth. It is of the essence of orthodontics as a science that it should be one of the normative sciences. We must have at hand some standard of reference with which we can compare cases of abnormal growth. Such a standard of reference does not at present exist, and in my judgment the first business of orthodontics as a science is to provide

one. Such a standard of reference must provide not merely means and standard deviations of various face measurements, but also show us their correlations with one another and with coordinated measurements of teeth and arches, and provide these for all the periods of childhood and adolescence up to adult life. When this work shall have been done the norms so provided will have made possible an exact comparison of different types of face with one another, and of different types of dental abnormalities with the facial abnormalities which accompany them. They will enable us to correlate observed growth changes in the living face with the inferences which have been drawn from skulls as to the positions where and the ways in which growth takes place; they will inform us as to the periods of growth activity and quiescence, they will enable us to observe the ages at which characteristics which are fundamentally hereditary severally disclose themselves, and they will free us in due time from the primitive crudity of Class I, Class II and Class III. But these results at present are still far to seek. In the apparently striking cases which I have brought before you the comparison has perforce been made with only three series of norms constructed from but a small number of cases, and although these were carefully selected the figures will have to be modified in accordance with the results of future research. It will be only when means shall have been obtained and their correlations determined for a large number of cases for each successive age period of one year that adequate data for reference will be available, and it will be only when this work shall have been done and we shall have learnt to apply such methods to our study of the abnormal growth of the face that we shall be able to regard orthodontics as in any true sense a science.

DISCUSSION

Mr. Campion said he felt his paper was one which hardly lent itself to discussion of the moment, but he hoped when published the members would find it interesting to peruse.

Mr. Badcock said he was about to make the same remark himself. The paper was an extraordinarily valuable one, but he thought it was quite impossible to discuss it and thoroughly digest it. He would only like to express his great admiration for the work which Mr. Campion had done and was still doing for this very important branch of science.

Dr. Quintero said Mr. Campion had delivered a most interesting paper which showed an enormous amount of work. Everybody who had followed his previous work knew its great value. He was not very familiar with the measurements Mr. Campion had used, but he could well understand what benefit would be derived from their application to every case which presented itself for treatment or consultation. There were, however, a few points which were not perfectly clear to his mind: the first being what Mr. Campion called the correct position of the vertical line which went from the most prominent point of the forehead to the tip of the chin, and also what he would call the correct position of the lip line. These lines, to his mind, had a great defect; they were drawn partly from movable parts. The tip of the chin which served as one limit to both of these lines was essentially movable as was seen in the second picture of the same case which he showed, so that if he took measurements using these lines according to the position of the chin the measurements taken from those lines would differ. He would understand much better taking measurements from portions of the head which were not movable such as the horizontal plane of Frankfort or the orbital plane which was derived from it, because then we had absolutely fixed points, or as nearly fixed as anything could be in the head with the exception of the nasion which we could not get at, and we could then get measurements which could be compared at different stages of the

treatment such as had been done by Simon of Berlin who, if not the first, was one of the first to use these planes. He, himself, had started using them, and had derived great benefit therefrom. He approved most heartily what Mr. Campion had said in regard to the influence of the soft parts in the development of the arches. Those who had had occasion to treat soldiers during the war had probably noticed in cases where there was injury to the soft parts, even in those adults, there were changes in the bone incident to the loss of the soft parts. He had present in his mind the case of a soldier who had lost his tongue, and shortly after it was noticed that all the teeth in both jaws had started to lean towards the palate on the lingual side as a result of the loss of the tongue, so that although one could not always see the effect of the insufficiency of the muscular parts of the lip and cheek, one could always see the effect of the loss of the tongue. He wished to express his high appreciation of Mr. Campion's work, and to say again how interesting his paper was, and how thoroughly he was in accord with him, with the exception of the manner in which he took his measurements starting from points in the head, which did not allow of perfect comparison at different stages of the treatment.

Dr. Hipwell said he would like to take the whole morning to discuss Mr. Campion's interesting paper, but as that was impossible he would just like to mention one point—the influence of the abnormal functioning of the tongue, lip and cheek. He thought it was impossible to overestimate the importance of the little muscle with a very long name—"Levator labii superioris alœqui nasi." It seemed to be one of the greatest adjuncts for development of the face.

Mr. Campion said: I thank you for the kindness with which you have heard me. I am sure the whole paper bristles with points which will need discussion later on: at present it only remains for me to thank you for your hearing.

THE PRESERVATION OF THE DECIDUOUS DENTITION*

By L. F. Fouraker, L.D.S., London, England

I WISH to draw your attention to some of the conditions we meet with in the deciduous dentition, and to put forward some suggestions which may be helpful in preserving these teeth.

I have the opportunity of examining some three hundred children every month in the elementary schools, and the condition of the mouths of some of the children gives me plenty of food for reflection.

About one-third of the children have healthy mouths, but even they do not very often have a complete and efficient masticatory apparatus; too many of them have the deciduous molars missing through premature extraction, due, in practically every case, to caries.

I think that much could be done by the dental profession if they laid emphasis on this needless extraction of teeth, because I am sure that a great many of them could be saved if the school dental surgeons were given better facilities for doing so.

This practice of almost wholesale extraction at the present time is certain to bring with it more trouble for the children as they grow up.

We see every day cases of malocclusion which almost drive us to despair simply because the deciduous teeth were prematurely extracted, and we are forced to do more extractions in order to put the child's mouth in a reasonable state of efficiency and appearance.

Many of these children will grow up and not take much care of their teeth, and as a natural result of the present policy, very many of them will have permanent dentitions which will be a happy hunting ground for gingivitis, caries and pyorrhea, due solely in a great many instances to irregularities of the teeth, and we shall continue in the vicious circle of more extractions and the fitting of dentures.

How are we going to try to put a stop to this wastage of teeth and injury to health?

1. We should endeavor by every means to get into the closest cooperation with the proper authorities and the teachers in charge of the children. They are the first persons who must be interested; secondly the children themselves and their parents, because without the consent of the authorities and teachers we cannot get at the children. The practical part of the work should be to save as many teeth as possible, and condemn to the forceps as few as possible.

2. When the mouth has been put into good working order the child should be shown how to brush the teeth correctly, and definite written instructions pointing out the best way and time for this to be done should be given to the parents.

*Transactions of British Society for the Study of Orthodontics.

3. To supplement the chairside talks, lectures should be given to the parents and also to the children, and I feel certain that by this means much could be done to show that caries can be avoided to a great extent by paying correct and regular attention to the hygiene of the mouth. At the same time stress should be laid on the advantages to be gained by a proper diet of coarse foods, raw fruits and vegetables; also parents should be impressed with the importance of having a definite time for meals, and not allowing their children to eat at all times. These lectures should be given by men who understand their work thoroughly and are in sympathy with it; much better results would come if they could be given in conjunction with lantern slides to illustrate the various points. The use of lantern slides is, I think, very important, because it would help to give people a better idea of what a clean, healthy mouth looks like.

4. Propaganda. I think that the dental profession has sadly neglected this type of teaching, and I think we are missing a tremendous opportunity of disseminating sound advice to the nation at large by not going in for it.

Dentists number some 16,000, and the population of the country is round about 48,000,000. How can we reach all these people except by articles in the papers? Criticism of this would be that it would amount to advertising if the writer of the article had his name at the end of the article. Why not select a small committee (two or three) to carry out this work? Articles could be written by the right men, who would receive a suitable fee for the work, and the articles published under the auspices of the committee, and if it was pointed out at the start of the campaign that this committee was the mouthpiece of the dental profession, I am sure that we should soon begin to see some results for the better in the state of the teeth of the nation as a whole.

Finally, as a young member of the profession, I feel that we are not doing all we can to teach the people the value of sound teeth and healthy mouths; and to obtain this result, we must show the people by our own work, by lectures to all, and by propaganda carried out on sound and broad principles, how much they stand to benefit by attention to their teeth.

DISCUSSION

Mr. Rt. Lindsay said Mr. Fouraker had been dealing with a subject which he had always felt to be a real source of interest to such a Society, i.e., preventive orthodontics. He was sure it would interest Mr. Fouraker to know that there was at the present moment in existence such a committee as that to which he had referred. The Dental Board of the United Kingdom was spending money at the rate of £5,000 per annum in order to promote propaganda in oral hygiene. One of the most important aspects of that propaganda was the means whereby expectant and nursing mothers, and through them, their children, might be made better dentally. The campaign embraced all the matters upon which Mr. Fouraker had remarked. He was certain that the results, in the comparatively near future, would be beneficial for the nation at large. It was also interesting to know that the British Dental Association had a Committee at present investigating the question of orthodontic treatment for elementary school-children; a distinguished member of the Society for the Study of Orthodontics was the Chairman of that Committee. He recalled an experience which he feared might horrify the members present; he had visited a school clinic, and had asked one or two questions as to the work done. The dentist in charge said it was his routine practice to

extract deciduous teeth. He (Mr. Lindsay) was hoping to visit that town and look at those children later when they were grown up, with a view to observe the results. He was assured that this practice had been carried on for some time, and that, when the children came back later for treatment of their permanent teeth, it had not been noticed that the treatment had any bad effects. That might appear to be an extraordinary statement, but it occurred to him that there might be something in it; that, if one extracted freely deciduous teeth, not simply one or two, there might possibly be less harm than was commonly supposed. He desired to thank Mr. Fouraker for dealing with such an interesting and important subject; one which he was sure was going to be of very practical interest to the country in the near future.

The President said he was sure the meeting would be pleased to hear the opinions of some of the younger men who might be occupying the position of school dentist.

Mr. Riddett said he was possibly in a position to say one or two words on this matter as he had spent very many hours of chairside working on school children. He felt that nobody who had not done this work was in a position to criticize or to know the exact state of affairs which confronted the dentist when he did this work. He would like those present to imagine what happened when a dentist began his session of two and one-half hours. In that short space of time he would have to treat at least ten, possibly twelve, and sometimes fourteen children. He did not say there was a great deal for each child, but that number of children had to pass through his hands, and he had to deal with them thoroughly in order that in future sessions his work should not be overwhelmed with reappointment cases, i.e., children who had not been cleared up at that session. In the schools 33 per cent or possibly more of the children were in need of treatment. As everybody knew, during school years caries were very rampant; in many cases children came up for treatment with seven or eight carious molars. The dentist was faced with the problem of what to do; almost invariably he was compelled to put such a child under an anesthetic and have the teeth cleared out. That was a simple case; where one found septic teeth one could not do otherwise than extract them. He had hoped to hear a little more from Mr. Fouraker as to what he would do in a case where the maxillary or mandibular secondary deciduous molars were in such a condition that it was impossible to fill them satisfactorily. He believed it was the practice of some dentists to clear out those teeth when they were infected and the pulps were dead, so that the secondary molars should not give trouble with regard to malocclusion, with which it was difficult to deal. After six years' experience of such work in the course of which he had examined perhaps 30,000 children, he found that it was possible to pick out children who had had these wholesale extractions, and in many cases it was found to be best to clear out those teeth. He was not prepared to say that when those children reached the age of fifteen or sixteen years, that problems might not arise owing to the crowding of the premolars; but nature appeared to look after those cases in an extraordinary way, and very often when children had crowding of premolars it was not a difficult matter to treat those cases by extraction. The school clinic dentists were faced with an enormous problem. When he personally first took on this work he was told that he had to get through it and do the greatest good for the greatest number. It was, of course, impossible to give ideal treatment under such circumstances. All one could do was to try to find out the best way. Mr. Lindsay's remark as to the practice of the dentist at the clinic had caused him to speak because he thought Mr. Lindsay must be under a misapprehension; he could not imagine any dentist undertaking this work extracting the whole of the eight deciduous molars as a routine treatment. He thought that what probably happened was that when that dentist was faced with say four or five diseased and hopelessly disorganized teeth, he might extract the opposing healthy teeth; that was called symmetric extraction. He felt it would be regrettable if at a meeting of this sort it was thought that any dentist in his senses would act in the way that Mr. Lindsay had suggested.

Mr. Lindsay said that speaking rather rapidly he had perhaps given rather a wrong impression. The dentist extracted all decayed teeth and cleared out all decayed deciduous teeth and was quite skeptical as to any bad results coming from the practice. He did not criticize the action of the dentist, but was interested to know whether the treatment had the good results claimed for it.

The President asked if there had been any effort to fill teeth.

Mr. Lindsay said no, not decayed deciduous teeth.

Mr. B. Samuel said he unfortunately could not claim to be one of the younger members, but he could claim to have done some of the very earliest work in London on elementary school children. He thought Mr. Fouraker was perhaps a little too pessimistic. He personally saw a great number of children, and had been seeing a great number of children thirteen years ago; he thought there was a great improvement in the condition of children nowadays; one did not experience the same appalling conditions of general decay, and his impression was that there was not the same percentage of bad teeth. He put that fact down largely to the effect of propaganda work. A certain amount of propaganda work had been done indirectly during the war by soldiers receiving dental treatment and passing it on, speaking of the benefits of that treatment in their homes. He did not know whether it was the general opinion, but his impression was that one experienced less very bad cases among elementary school-children than hitherto.

Mr. A. T. Pitts said that when a dentist attended children he obviously had to look ahead to the future. He must keep in mind two points of view; one was that if deciduous teeth were lost before their time almost certainly there would be crowding of the premolars; the second point of view was that by leaving septic teeth in the mouth one was running a very great risk of injuring the nutrition of the growing child. If one kept in mind exclusively one or the other point of view and did not endeavor to reconcile them both in some degree, he believed one was making a mistake. Occasionally doctors wandered down to his department in Great Ormond Street. He had pointed out to one of these doctors the other day that in the cases of many of these children it was necessary to extract freely; this would lead to crowding, but crowding was a minor evil as compared with sepsis. The doctor had said that he was interested to hear that, coming as he did from one of the Colonies, because it was a common experience there to find dentists refusing to take out deciduous septic teeth, because they said it would spoil the arrangement of the secondary teeth. He (the speaker) had seen a lady that morning who had told him that her child had for over a year had four or five septic teeth with sinuses, but the dentist refused to extract, and, in fact, only did so when great pressure was brought to bear on him by the family doctor. That case indicated the evil resulting from one point of view, while the dentist of whom Mr. Lindsay spoke was an example of the evil of the other point of view. He found that there was much less crowding of the deciduous dentition if one did not do symmetric extraction. He thought the practice of symmetric extraction was a fallacy. Another factor which in his opinion led to unnecessary extraction was the practice of making a diagnosis straight away as to which teeth could be saved and which could not. When one looked into the mouth of a child with caries, one saw that there were some teeth which had to come out, but that there were others which could be saved, while others might be uncertain. His practice was, if the child was not suffering pain, to start with all those doubtful teeth; if on opening them up he found they were septic or with exposed pulps, he held the opinion that it was better to extract them. Then when he had finished all his fillings he was then left with teeth which had to be removed. If that procedure was adopted it was usually found that the number of teeth which had to be removed was smaller. There was also the great advantage of leaving the extractions under an anesthetic to the end, so that the child's confidence was not destroyed at the beginning of the treatment.

Mr. Packham said it occurred to him that if the deciduous teeth were all removed the massaging effect which was produced by mastication upon the developing permanent teeth below them was absent and might have a definitely harmful effect. He did not know whether anybody had done any experiments in that direction, but it occurred to him to wonder whether the calcification of the permanent teeth (if they were no longer massaged by the mastication of the deciduous teeth in front of them) was impaired, and whether such teeth were more likely to become the victims of caries.

The meeting concluded with a vote of thanks to the speakers.

THE CHOICE OF ORTHODONTIC APPARATUS IN THE MORE COMMON FORMS OF MALOCCLUSION*

By H. R. Evans, L.D.S., London, England

I FEEL that first of all I ought perhaps to apologize to you, because I fear that you will find very little, if anything, which can be regarded as original in this short paper, and I am afraid that most of it will be of an extremely elementary nature. Unfortunately, owing to force of circumstances, I was not able to devote much time to preparation, and this, together with the difficulty of obtaining suitable data at short notice, has handicapped me considerably. Again, I think that most of you will appreciate the fact that to stand up before such a distinguished audience as I have this evening, and to try and interest them even for a short while, is by no means an easy task. However, there are perhaps present one or two very junior members, who may find something of interest in my remarks, and profit by them. If such is the case, perhaps I may not have entirely failed.

When confronted with the problem of choosing the type of appliance to be used in a case of malocclusion, there are certain definite principles which we always endeavor to embody in the construction of the apparatus, and in describing the attributes of an ideal appliance I think that I can do no better than quote the words used by Mr. J. W. Mayer in his paper on "Torsion: Some Facts and Probabilities," read before this Society in October, 1924. Mr. Mayer said: "My ideal apparatus would be comfortable, hygienic, easy to construct and adjust; the force exerted by it would be gentle, and yet continuous, there would be no possibility of applying too great a force in adjustment—a very important provision, for we are sometimes in a hurry, and inclined to overdo things—each adjustment should be definitely measurable in some way." These remarks, I think, sum up admirably the points which should be borne in mind when constructing an appliance. In the first place, if due regard is not paid to comfort, the appliance, if removable, will spend most of its time in the patient's pocket. Simplicity in construction and adjustment should be the keynote. A complicated appliance instead of carrying out the necessary work very often produces movements which were never intended. We have long learned the wisdom of using forces which are slow and continuous in their action. We are told that the inevitable result of prolonged and extensive orthodontic treatment is the dread periodontal disease. Such is undoubtedly the case if teeth are moved too quickly; the growth of bone is also adversely affected, and the difficulty of retention greatly increased. Intermittent forces undoubtedly do not usually bring about ideal results. Hygiene is of course a very important factor, our work is of no avail if gingival irritation and its sequela are caused through lack of cleanliness. If we can so construct

*Transactions of British Society for the Study of Orthodontics.

our appliance as to avoid applying too great a force in adjustment, then we have indeed accomplished something of great value to ourselves. Our adjustments can then be made with confidence, and without the loss of much time, which is of priceless value to the dental surgeon.

Now, I do not propose in this short communciation to discuss in detail the relative advantages and disadvantages of fixed and removable appliances, but perhaps a few general remarks will not be out of place. For my own part, I have always tried to keep a perfectly open mind on this subject, and when deciding on the type of appliance for a given case, I choose the one which I consider will carry out the work in the most efficient manner, whether it be fixed or removable. At the same time I must confess to a partiality for removable appliances. If I consider that a plate will give me as good a result as any other appliance, I always choose the plate. I cannot help thinking that something which can be taken out of the mouth, and cleansed at intervals, has a distinct advantage, at any rate from a hygienic point of view, over an apparatus which is a fixture, and which surely must be very difficult, if not wellnigh impossible, to keep ideally clean. Some authorities base their objections to appliances such as the labial and lingual arches on the assumption that direct injury is caused to the periodontal membrane by the placing of anchor bands on the teeth. This in my experience is a debatable point, as it does not seem to me at all necessary to force the band right up under the gum in order to obtain adequate retention. The main object of cementing the band, I regard as a prophylactic measure which prevents the access of food débris and fluids to the tooth surface, thus avoiding decalcification of the enamel, although at the same time it does assist in retaining the band to the tooth. I *have* noticed, however, when patients wearing fixed appliances have presented themselves for inspection, that as a general rule quite an appreciable amount of food débris has collected around the bands, and it is here I think where the chief danger lies. Frequently the gum around the tooth becomes inflamed, and very often this inflammation tends to spread to the adjacent teeth. Whether the resistance of the patient is sufficient to allow of the complete recovery of the teeth in question, I am not in a position to state. I have not had the opportunity of examining teeth some years after the anchor bands have been removed, but I should welcome the views of members who have had a long and wide experience of these cases. One great drawback, I think, to fixed appliances is the fact that they necessitate very frequent visits to the dentist, and in the case of children at boarding school, this is of course impossible. In private, one's orthodontic practice may quite feasibly consist entirely of patients who are away from home for the greater part of the year, so that the use of fixed appliances may be entirely out of the question. Fixed appliances, when manipulated by skilled hands, without a doubt carry out their work in a most efficient manner, and I think that most of you will agree with me when I say that they are in the main more efficient than removable appliances. They, however, can be most dangerous when not manipulated by a skilled operator, and for this reason perhaps it might conceivably be better for the general practitioner, who may not be in the habit of treating many cases of malocclusion in the course of his practice, to confine himself to appli-

ances which do not require so much orthodontic knowledge and skill in their manipulation.

In the matter of retention and rigidity fixed appliances are superior to removable ones; this of course is a very important point, as in cases where accessory springs are being used, these cannot be expected to do their work properly if the appliance lacks rigidity. There is also the certainty that they are always being worn and not being inserted a few minutes before seen by the dentist. Perhaps some of the members will kindly give us their views on fixed and removable appliances at the close of my paper. It may be that my partiality to removable appliances is due to influence brought to bear during my youth. I can well remember during my student days, the surgeon of the day asking the class the type of appliance they would construct for a case under consideration. One poor misguided youth said that he would use a fixed appliance. Words fail me to describe the consternation which ensued. Let it alone be placed on record that the student in question was never afterwards seen at that particular clinic. However, since becoming a member of the British Society for the Study of Orthodontics, I am glad to say my general outlook has been considerably broadened, and I sincerely hope that its influence will continue to enlighten me on many problems which at present tend to keep me in a pessimistic mood.

It has occurred to me that in the case of the practitioner who does not have the opportunity of treating many cases of malocclusion it might perhaps be to his advantage to select some appliances applicable to the more common types of irregularities with which he meets in everyday practice, and thoroughly master their technic and adjustments, rather than that he should have a scanty and superficial knowledge of several types of appliances which he never has the opportunity of becoming familiar enough with in order to be really skilled in their manipulation. Of course I do not wish in any way to discourage those who are possessed of inventive genius, and who wish to experiment; my remarks are directed rather towards those who have not the time or perhaps the inclination to interest themselves in this subject.

It is now my intention to show you a few slides, illustrating some types of appliances which I have found in my short experience to answer the requirements very well, in some of the more common forms of malocclusion, which we meet in daily practice. I must ask you to excuse the lack of finish to the appliances, but as I have mentioned before, they had to be made at very short notice, and they are merely being shown to indicate the principles employed. Probably the first orthodontic case which the student has to treat, is one in which an incisor has to be brought over the bite, and I am sorry to say that my experience is, unless you watch him very carefully, he shows an overwhelming desire to specialize in this type of malocclusion. I have always found vulcanite pegs inserted into a plate quite satisfactory in these cases. It is generally necessary to cap the back teeth; the peg should project sufficiently long so as to prevent the plate from going right home. The mandibular incisors then impinging on the plate will bite it home, thus forcing the incisor forward. The force transmitted is not continuous, but if the peg is not allowed to project too far the results obtained by regulating teeth in this

manner are quite satisfactory. It is very important to arrange for the mandibular incisors to occlude with the plate. When the four maxillary incisors are inside the bite, it is very often necessary to build a platform projecting in the front, in order to allow the mandibular incisors to occlude.

THE RETRACTION OF MAXILLARY INCISORS

Figs. 1 and 2 show you the type of appliance I invariably use for the retraction of maxillary incisors. The back teeth are covered with a metal cap on the buccal surface of which is soldered a tube. The cap and tube are embedded in the vulcanite. The labial wire is attached to the plate by passing it through the tube, bending it back, and hooking it around itself in front of the tube. The great advantage of this is that in the event of its being broken, as so often happens, it can easily be replaced without loss of time. The metal cap which is struck up in Manhattan platinoid, gives added strength to the plate, and is not very easily bitten through. When only a thin cap is desired the metal is not covered with vulcanite, and is usually gilded. B size round gold wire is used for the labial wire. When using this type of plate in a case of superior protrusion, where the first premolars have been extracted, I find it seldom necessary to arrange for the retraction of the canines, prior to bringing back the incisors. The teeth come back very evenly by using the W spring. In cases where room is being made by expansion, pressure is automatically brought to bear on the incisors. I am fully aware that by capping the back teeth I invite criticism, but my experience is that, provided all the teeth are capped, no evil results will accrue. If, however, certain teeth are allowed to elongate an open bite will result. This is of course done deliberately when it is necessary to cure a deep overbite.

Fig. 3.—This slide shows the photograph of a plate I have found very useful in cases where for some special reason it is not desirable to cap the teeth. It is more applicable of course to cases where the first premolars have been extracted. The force is exerted by a half round split gold wire.

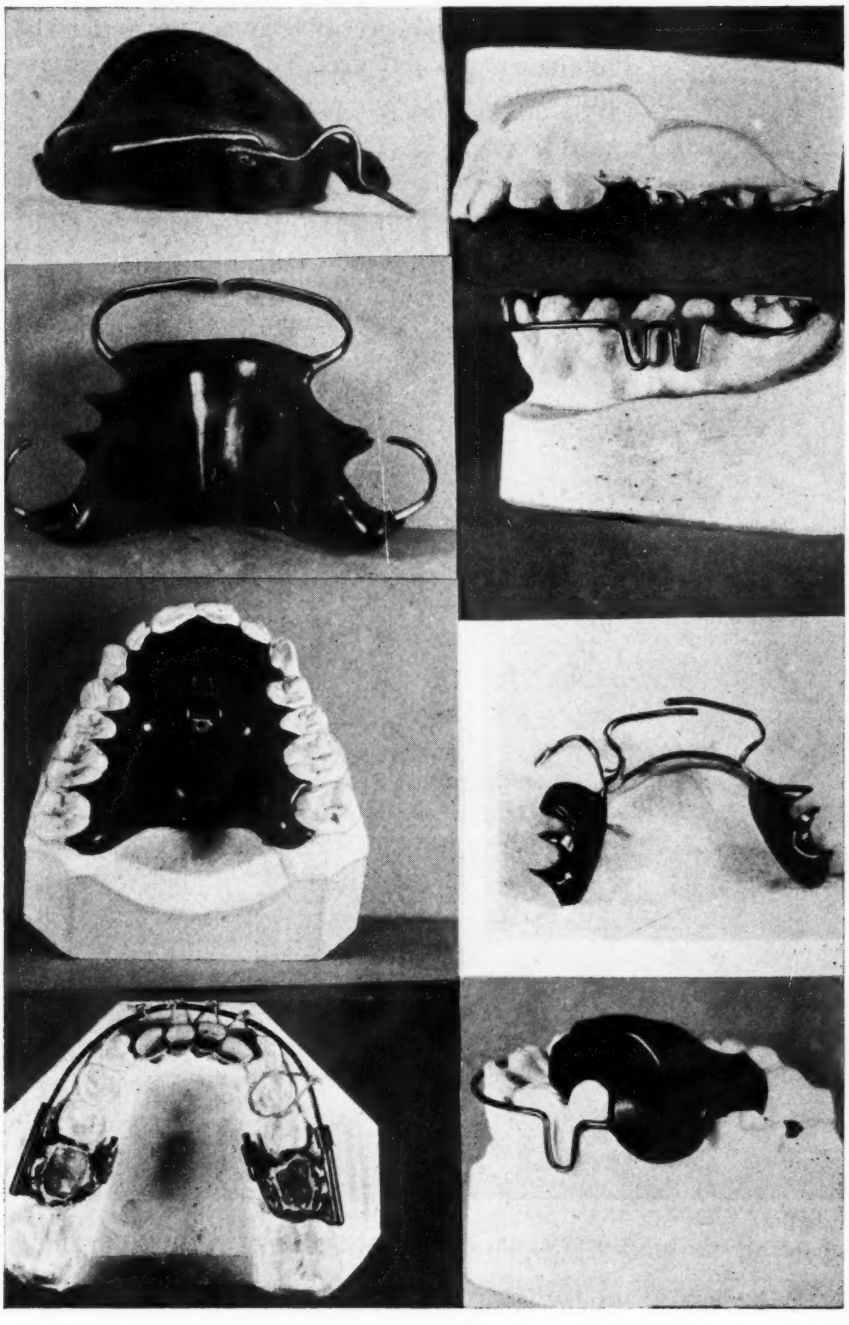
Fig. 4.—In cases where there is insufficient room to bring the wire between the teeth, I have sometimes used this type of plate. Retention is obtained by means of cribs on the molars, and the labial wire with W spring is soldered to the cribs. The cleats on the central incisors are of course to prevent the wire riding up the teeth. A certain amount of difficulty is experienced in keeping this plate in position, and I cannot say I have found it very successful.

THE EXPANSION OF THE ARCH

Fig. 5.—An old and trustworthy friend of the orthodontist is the Badcock screw, and I think you will agree that it is the best design we have for expanding an arch with a divided plate. The screw and wire and sleeve impart rigidity to the plate. The two halves open parallel and are prevented from revolving on one another. The plate being rigid, finger springs can be attached to perform accessory movements. The screw, which is operated by a single nut, can be turned by the patient at stated intervals, and the expansion can go on without frequent visits being made to the dentist. In the improved type of screw, a spring tension device, which is housed within the

winged hub, prevents the screw from working loose and being moved by the tongue, or turned when the plate is being cleansed.

The number of turns of the screw necessary to produce a certain amount of expansion can be easily calculated.

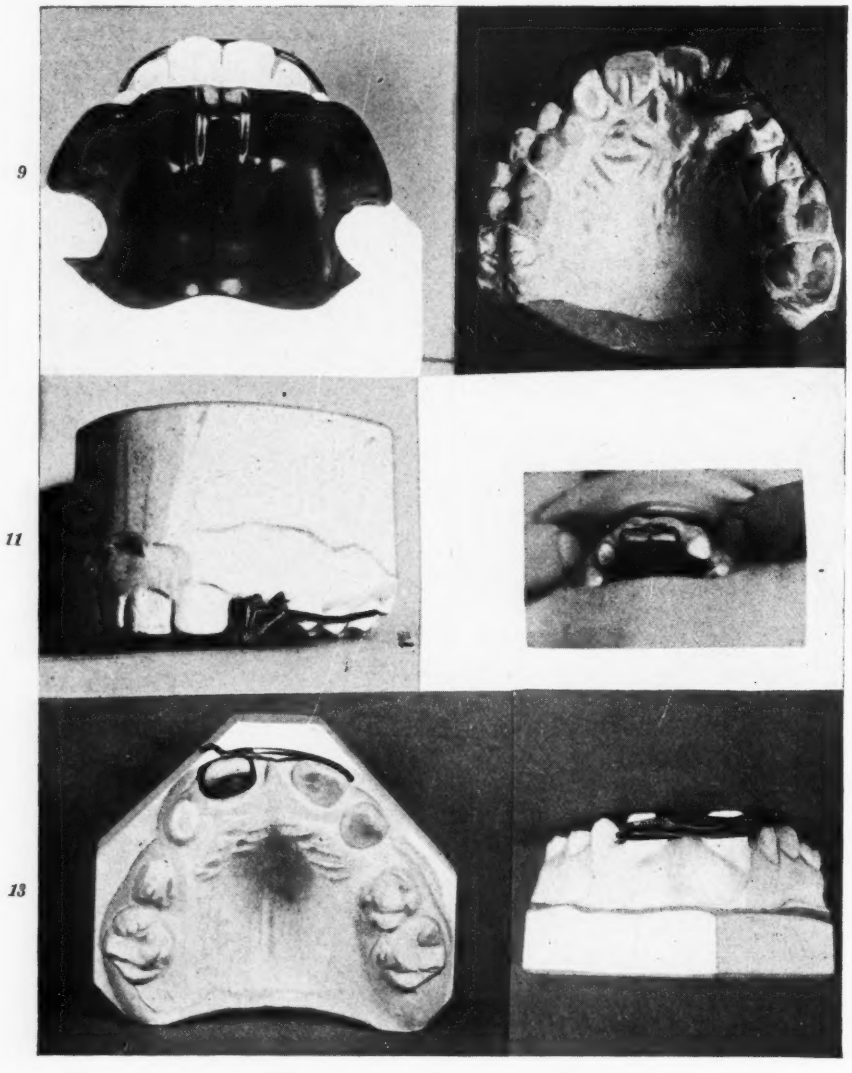


ADVANCING OF MANDIBULAR INCISORS

Fig. 6 shows a type of plate which can be used for advancing mandibular incisors. The force is exerted by the finger springs soldered to the lingual bar. It is advisable to fix to one or two of the incisors pinch bands, carrying

a shoulder on the lingual aspect. This shoulder of metal prevents the finger springs from riding up the teeth. The cleats on the molars prevent the plate from sinking.

The most efficient method of treating this type of case, to my mind, is by means of a buccal arch (Fig. 7). The teeth are ligated to the arch by means of grass line ligature, which has the property of contracting under the influence of moisture. If a 19-gauge alignment arch be used, the springiness of the arch can be used in addition.



TREATMENT OF CLASS II CASES

In treating cases of inferior retrusion I find that the plate shown in Figs. 8 and 9 is most efficient. The Badcock screw for expanding the arch, the incline plane for guiding the mandible forward, and the labial wire for retracting the maxillary incisors are all combined in the one plate. The bite is raised by capping the premolars or deciduous molars as the case may be. The inclined plane is so arranged that the patient must of necessity close in the

correct forward position. In order to insure constructing the plane at the correct angle it is advisable to previously obtain the patient's bite in the forward position.

TORSION

The most efficient appliance for the rotation of an incisor that I have up to the present come into contact with is the Korbitz appliance. Figs. 10 and 11 show this appliance in position. A pinch band of Blue Island metal is made to the tooth to be rotated. A tube is soldered to the pinch band on the buccal surface parallel and near to the outstanding border of the tooth. A rod, bent at right angles, is fitted into the tube, and adjusted so that it rests on two or three of the adjacent teeth. These teeth act as the resistance. A ligature, rubber or grass line, is stretched from the rod to a hook soldered to the lingual aspect of the tooth near the instanding border. The tooth is in this manner rotated in its own axis. I have found this method satisfactory for rotating premolars.

THE BRINGING TOGETHER OF INCISORS

I have for some time discarded plates for bringing incisors together, and am now in the habit of using pinch bands and ligatures. In cases where the teeth are widely separated my experience is that there is a tendency for the teeth to become rotated with their distal borders directed outwards, as shown in Fig. 12. By having a prolongation of the hooks, as shown in Figs. 13 and 14, however, I find that this fault is obviated. The teeth follow the path of the wires, and are thus prevented from rotating. I prefer to use grass line ligature, as its action is slow and continuous.

Those are all the appliances I have to show you, and I think that the majority of the more common malocclusions which we come across in daily practice can be successfully treated with them. I have made no mention of Angle's ribbon arch and the fashionable lingual arch. The former, although a beautiful piece of mechanism, I consider a most treacherous appliance. I find it extremely difficult to prevent it from producing movements which are not necessary. It requires a very skilled operator.

I am afraid I have not up to the present had sufficient experience of the lingual arch, so am not competent to talk about it. It has undoubtedly a great future in front of it, as there appears to be no limit to the movements which it can produce.

I have no more to say, except to acknowledge my indebtedness to those whose ideas and cases I have made use of. I have to thank Mr. Humphreys and Mr. Shirlaw, of the Royal Dental Hospital, for making the appliances, and Miss Clifton, of the Royal Dental Hospital, for photographing the appliances, and preparing the slides in such an excellent manner. I have to also thank you, sir, and the members for their kind and patient attention.

DISCUSSION

Mr. J. H. Badcock said he entirely agreed with Mr. Evans as to the advisability of having one's apparatus as simple as possible. There were many points in Mr. Evans' paper that might be discussed; he would merely mention one of them. He would like to suggest

that Mr. Evans might find a screw useful, not only as a means of expansion but to bring forward teeth either singly, or in a group, e.g., the mandibular incisors. Mr. Evans had said that he was in the habit of using vulcanite wedges. He (the speaker) suggested that instead of a wedge he might try a screw—a simple piece of wire threaded, with a slot cut in the end touching the teeth. If the patient were given a screwdriver which would fit that slot, the handle being marked with an arrow to show the patient which way to operate it, and if he were instructed to turn that screw a quarter of a turn every other day, it would be found that the tooth would be advanced just a desired distance in a definite time, quite easily and certainly; the mandibular incisors could often be advanced in this way. Sometimes the screws tended to rise up the backs of the teeth; but that occurred very seldom if one used a device for fixing which crossed the crowns of the teeth.

Mr. A. T. Pitts said Mr. Evans was in the very happy position of being able to hear views expressed by quite a considerable number of dentists at the Royal Dental Hospital, such views being very often violently opposed to one another; Mr. Evans had the advantage of seeing all sorts of different methods adopted, and of comparing them; he could therefore, as far as results were concerned, speak with a very great deal of authority. He (the speaker) was in entire agreement with Mr. Evans with regard to the simplicity of appliances; he found himself more and more relying on a small number of appliances for doing the work. He also agreed that in many cases a removable appliance was better than a fixed appliance; but there were cases in which a fixed appliance was undoubtedly better. He had always found it rather difficult to retract maxillary incisors by means of a fixed appliance in which the force of an elastic was exerted on the front teeth; he found that one got a great deal of inflammation of the gums. With regard to the removable appliance for retracting teeth, particularly the concertina pattern, one had to bend the curves and put into the wire a considerable degree of torsion; there was always the risk in a removable appliance of the spring becoming the fixed point tending to dislodge the plate, rather than the plate being the fixed point. When one got this torsion in a continuous wire, it was rather apt to dislodge the plate. With regard to the use of finger springs on the Badcock plate, he thought there was much to be said for the trade union principle of "one man one job," and one plate one job; that is to say, if one were going to try to do two jobs with a plate, they should be two jobs of a similar character. Mr. Badcock had mentioned the use of a screw to bring out an incisor; that was a similar kind of movement; since the Badcock plate had to be bitten home for the nut to act, so also that biting home would force out the teeth; the two movements were as it were harmonious. He was thinking of the case of putting in a finger spring to bring out an incisor with a Badcock plate. Such a procedure was extremely liable to dislodge the plate. Sometimes one made the mistake of trying to accomplish too much with a single appliance; it was much better to accomplish one movement and then, if necessary, make another plate for a different type of movement.

A NOTE ON PERCUSSION AS A STIMULUS TO THE GROWTH OF BONE*

By Mrs. Lindsay, L.D.S., London, England

IN THE discussion following the paper in which Dr. Quintero described his ingenious method for dealing with incisors which were in faulty alignment, or which had lost the incisive edge through accident, and in consequence were not on a level with their neighbors, the question arose as to the liability of those teeth to return to their former position, and Dr. Quintero was questioned as to means whereby this danger of relapse might be obviated.

In conversation with Dr. Quintero after the meeting I suggested that percussion of the alveolus over the apex of the moved tooth might have the effect of stimulating new growth of bone in the socket, thus consolidating the position and rendering secure the result obtained.

This was not a haphazard suggestion, but was founded on a limited personal experience of the benefit of percussion in certain cases in practice; it was also supported by the record of a large number of clinical cases reported by H. O. Thomas, the surgeon, whose name is associated with the Thomas splint, and who was one of the most experienced of the early orthopedic surgeons.

In a series of papers written by him in 1886 on the treatment of "Fractures and Dislocations," Thomas describes his treatment of cases of delayed repair and union of fractured bones by flagellating the surface over the seat of disunion with a copper-headed hammer padded with rubber.

Some of the ununited fractures thus treated were of long standing and had been previously treated by all the known methods, including wiring, rubbing the broken ends together, resection, etc. All attempts to effect union by these means had failed, yet success was attained when percussion was well and truly applied.

The case which, it appeared to me, bore most upon the present interest was that of a young girl whose patella slipped over the condyles of the femur, despite the fact that strong leather caps, firmly strapped, were employed to hold them in position.

Thomas hammered the surface over the condyles with moderate percussion every week for five months for the left patella, and during nine months for the right, and by this treatment alone induced a ridge of bone to form on each condyle, thus making it impossible for the tendons to slip. Recent studies in the growth of bone have shown that one of the most effective stimuli to growth is intermittent pressure.

When I was in practice, after finishing the movement in a regulation case, it was my custom during the retention period to employ what I called "vibrant massage." This was carried out by means of the automatic gold plugging

*Transactions of British Society for the Study of Orthodontics.

mallet used in the electric engine, with the largest plugging point padded with the India-rubber cork of a novocain tube. I was employing Thomas' percussion method without knowing it.

This proceeding I found efficacious as an aid in the treatment of teeth loosened by any inflammatory process such as stomatitis, pyorrhea, etc. We may recall, in this connection, those cases not infrequently reported in dental journals, of the ultimate eruption of wisdom teeth or of canines in patients of advanced age, following on the insertion of artificial dentures.

I would suggest that this may be accounted for by the intermittent pressure consequent on mastication, stimulating growth of the alveolus and thus bringing about the eruption of the tooth. I had, for example, a girl of fourteen years of age brought to me for whom an unregistered practitioner had extracted a deciduous canine, and had thereafter inserted a plate bearing a single tooth, telling the mother of the girl that there was no permanent tooth present. The pressure of the plate acting on the alveolar bone stimulated renewed growth, which ultimately brought the retarded permanent canine into position.

I would suggest, therefore, that the method employed by H. O. Thomas, modified to suit dental conditions, might be employed with advantage to bring about certain orthodontic results such as:

1. Stimulating growth of alveolar bone around the roots of teeth which have been moved for purposes of regulation, and particularly in those cases in which a maxillary incisor has been brought down into alignment.

2. Hastening the eruption of retarded teeth, and generally for treatment of a stimulant and tonic nature applied to the gums in connection with orthodontic and other dental conditions. The method of applying this system of "vibratory massage" and of percussion can of course be varied in accordance with the ingenuity of the operator; an eccentric rotating point in the ordinary handpiece would produce the same effect.

If this communication seems trivial it has at least not taken up much time, and the fact that it has been submitted at all may be taken as an indication of the keenness of the Hon. Secretary as a snapper-up of unconsidered trifles.

DISCUSSION

The President said he thought Mrs. Lindsay's "unconsidered trifle" opened up a very wide field for discussion.

Mr. Livingstone asked whether Mrs. Lindsay invariably applied vibratory massage to the gums over the diseased alveoli in cases of pyorrhea, and also whether she had tried the effect of vibratory massage on the crowns of deciduous teeth that had been retained beyond the normal shedding period with a view to stimulating the succeeding teeth.

The President asked whether Mr. Sturridge, in his crusade for ionic treatment for pyorrhea, had not insisted as an after treatment to the actual ionization that there should be massage with vibratory rubber.

Mrs. Lindsay said "Yes."

The President said he himself had used that method to a great extent, until his apparatus had broken down.

Mrs. Lindsay, replying to Mr. Livingstone, said she would wait until she had treated the gums first; when the gums were restored as far as they could be restored to health, then

she would use the massage. She would not percuss over the crown of the deciduous teeth retained, but over the alveolar process over the gums. She had not tried it.

Mr. A. L. Packham read a short communication on "A Case Showing Tooth Movement." He showed models of the teeth of a girl of sixteen, the right central incisor tooth of which had been extracted at the age of twelve. The space had now completely filled up. The occlusion on the left side was normal. The occlusion on the right was apparently postnormal. This was not true postnormality, being due to the left maxillary teeth moving forward.

Mr. Badcock said he had a similar case where a right maxillary incisor projected very considerably. For reasons which he did not think it necessary to go into, he extracted that tooth. No other treatment had been undertaken. The boy was now grown up, and his right lateral was now touching his left central, giving an effect precisely similar to that shown by Mr. Packham. He had seen the boy recently, and had asked him whether he thought people had ever noticed that he had lost a front tooth; and the boy had replied that he did not believe anybody ever did notice it. In this case the mandible had its proper complement of teeth, and being postnormal the extraction of this particular tooth had allowed the upper teeth to come back and lie aaginst the mandibular teeth as they should do. He thought it was encouraging to know that such a good result could be obtained in so simple a manner, because there were many cases where ordinary regulation was out of the question and where such treatment might be adopted.

Mr. Packham, in reply to a question, said the central incisor in his particular case had been extracted at the age of twelve, the girl being now sixteen.

Mr. McMahon said he had dealt with a case in which the girl lost the maxillary central through falling in a ballroom. In that case nothing had been done; it presented a very unsightly appearance, although the gap had closed up. The accident happened at the age of nine.

Mr. J. H. Badcock said the case of missing maxillary laterals was rather analogous. In many such cases he had found that, if one extracted a mandibular tooth, it allowed the maxillary teeth to fall back and together until the canines touched the centrals, and the result was often very good. Sometimes one had to go a little further and extract two mandibular incisors. In a case where this was done the gap had closed up perfectly, the child having quite a presentable appearance, except that the arch of the mouth was a little flat in front. It seemed to him that this was far better treatment than endeavoring to fill gaps. To inflict on a young patient any mechanical device which could possibly be avoided, or anything in the way of artificial teeth was the greatest possible mistake, if one could find any other way of dealing with the case.

SOME DETAILS OF INTEREST IN A COLLECTION OF MEDIEVAL SKULLS*

By Violet H. George, L.D.S., London, England

IN THE course of some work on a collection of medieval English skulls found at Scarborough I have discovered several rather interesting features. There are three cases of unerupted canines, two in which cystic cavities occur and one showing a well-defined enamel nodule on the distal aspect of a mandibular third molar. None of these conditions I have noted are unusual, of course, in modern mouths, but I think it is always interesting to find them occurring in jaws of an earlier civilization. We are so apt to think that abnormal mouths and teeth are almost entirely due to modern civilization, but it is evident on closer inspection that these abnormalities are to be found in very early times.

Fig. 1 is the maxilla of a young adult, probably a man, with teeth showing a certain degree of attrition. Both canines are absent from the arch. The tip of the right canine is just visible, and on the opposite side a bony mass in the palate, lying nearly parallel with the alveolus, suggested the presence of an unerupted tooth. On cutting through the bone the canine was seen lying horizontally in the palate.

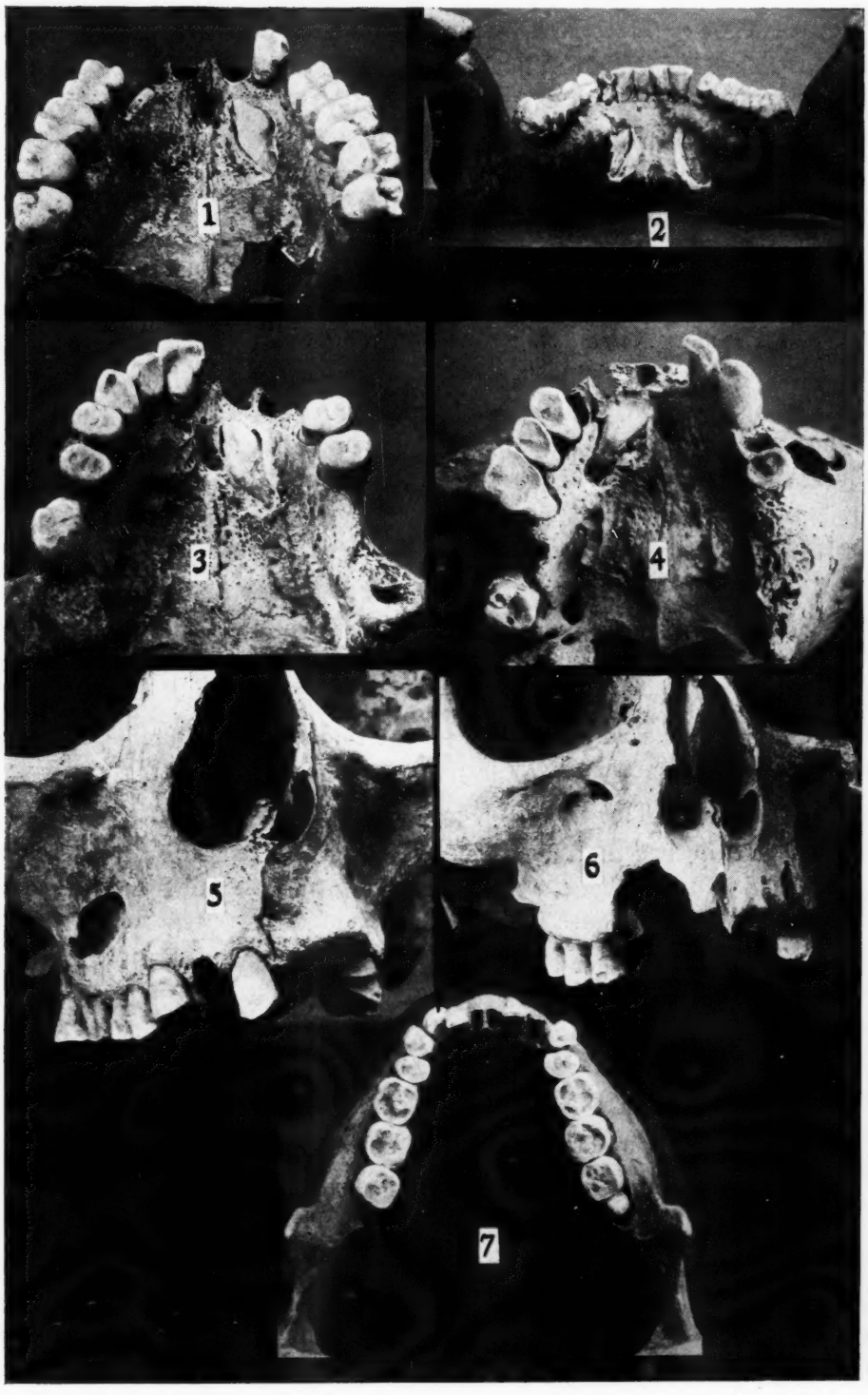
Fig. 2 is the mandible of the same case. Here a deciduous canine persists on one side, and looking at the buccal aspect there is nothing to suggest the presence of the permanent canines. On the lingual aspect of the mandible, however, two large bosses of bone were present just below the first premolars and were thought to be merely bony exostoses. On cutting, the absent canines were discovered lying vertically in the jaw. Figs. 3 and 4 illustrate two other cases of buried maxillary canines.

With reference to the remaining cases, Fig. 5 is that of a man's skull, showing a cavity on the buccal aspect of the premolars and first molar region. Although not visible in the slide, the palatine and anterior buccal roots of the first molar and the root of the second premolar project into the cavity which is smooth and rounded.

The next case, Fig. 6, is that of a woman's skull showing a large triangular cavity extending from the septum between the first and second premolars to the midalveolar point and posteriorly along the midline of the palate for 25 mm. The ala of the nose has been pushed up by the cyst.

Fig. 7 shows an enamel nodule attached to a right mandibular third molar.

*Read at the European Orthodontological Society Congress.


1
2
3
4
5
6
7

ORTHODONTICS: THE NECESSITY OF HISTORIES TO ESTABLISH ETIOLOGY; THE NECESSITY OF EXTRA FUNCTION IN RETENTION; THE NECESSITY OF PRESERVING SPACES CAUSED BY PREMATURE LOSS OF DECIDUOUS TEETH*

By Harold Chapman, L.D.S. (Eng.), London, England

THE NECESSITY OF COMPLETE HISTORIES TO ESTABLISH ETIOLOGY

I HAVE for some time felt that the causation of any particular case of malocclusion as given in the textbooks was not in the least convincing or that the author had proved his point. A year or so ago I began the etiologic investigations of some forty cases, some of which have normal occlusion; the detailed results are embodied in a paper,[1] but briefly they may be stated to be:

1. Normal occlusion occurs in many cases where so-called "causes" of malocclusion have been operative.

2. The causes referred to in (1) are not sufficient in themselves to cause malocclusion.

3. The only cause operating after birth, which might have had a harmful effect on the occlusion, seemed to be feeble mastication.

4. Antenatal causes appeared to be the factors of importance in bringing about malocclusions. These may be:

   a. Heredity. There is evidence to support this view.

   b. Causes other than heredity. There is evidence to support this view also and it is believed these causes will ultimately be proved to be the important ones in the majority of cases.

Antenatal causes, other than heredity, may be any harmful influence acting on (1) the germ cells of either parent before they unite, or (2) acting on the fetus. These influences are referred to by Murk Jansen in his book[2] and in a paper[3] and, if there is any truth in these views, which it seems impossible to doubt, then malocclusion is a form of "Feebleness of Growth" as referred to by Jansen, and where there is malocclusion it will usually be found that there is other evidence of feebleness of growth, frequently physical defects, which are not difficult to discover.

In the time at my disposal it is not possible to go into greater detail; in fact, this has already been done,[1] but since that time notes of additional cases have been obtained and the histories of two brothers are presented below. One, the elder, has normal occlusion (Figs. 1, 2, 3, 4, 5), and the younger one was Class II, Div. 1 (Figs. 6, 7, 8, 9, 10), though not a bad case, as his lower dental arch was good. His history shows that he had several other physical defects in early life, which his parents (who are well-to-do) have done all in

*Read at the Congress of the European Orthodontological Society.

TABLE I

CASE HISTORIES

1.	No. of case	911	475
	Born	March 12, 1912	Oct. 1, 1913
2.	Age. Sex	13 years. Male	11 5/12 years. Male
	Date of exam.	January, 1925	January, 1925
2A.	Difference in age *cf.* with next child older	2 years 5 months	1 year 7 months
3.	Occlusion	Normal	Class II, Div. 1 originally; has been treated for 3½ years previous to exam.
4.	Type of individual	Lateral	Lateral
5.	*Height sitting	—	730 mm. at 11 11/12 years
	total	4 ft. 8¾ in. at 12¾ years	4 ft. 5¾ in. at 11¼ years
6.	*Weight in clothes	6st. 4½ lbs. (28/1/25) = 40.14 kg.	5 st. 2¼ lbs. (27/1/25) at 11¼ years = 32.77 kg.
9.	Walked at	18 months	16 months
10.	Knock knees	No	Slight
11.	Flat feet	No	Very pronounced when young, improved with age, not very noticeable at present time
14.	Antenatal factors	Father's health normal. Mother's health normal. Had returned from holiday in Japan 10 months before his birth	Father's health normal. Mother rather run down after 5 summers in Hong Kong
15.	Factors at birth	Normal. Born at Hong Kong. Good English doctor and nurse.	Normal. Born in Hong Kong. Good English doctor and nurse.
16.	Other physical defects	—	Nails very thin during first 3-4 years. Almost normal now
17.	Weight at birth	8¾ b. (3.97 kg.)	7½ lb. (3.4 kg.)
19.	Diet first year	Natural 2 weeks. Had excellent nurse, with first-class experience of feeding all first year. Perfect digestion	Natural 2 weeks. Very small quantity of undiluted cow's milk with citrate of soda. Digestion never very good
22.	Mastication	Good	Good
23.	Comforter	No	No
24.	Breathing, day and night	Normal	Normal
25.	Adenoids	Removed at age of 6 at Victoria, B. C.	No
28.	Habits	Sucked left thumb for 2 years. Very obstinate	Sucked thumb for first year
29.	Rickets	No	No
30.	Illnesses	Whooping cough at 7 years. Mumps (slight) at 9 years. Chicken pox at 10 years. German measles at 11 years. Gets headaches from congested liver, cold or rich food	Apt to get slight dysentery during first two years. Whooping cough at 6 years. Chicken pox at 9 years. German measles (slight) at 10 years. Very apt to have styes on eyes up to 8 years. No headaches

*Note *re* height and weight of cases 911 and 475 compared with statistical tables:—

	No. 911	Age 12¾	No. 475	Age 11¼
	Actual	According to Whipple	Actual	According to Whipple
Standing height	1,443 mm.	1,434 mm.	1,365 mm.	1,361 mm.
Sitting height (age 11 11/12)	—	—	730 mm.	738 mm.
Weight with clothes	40.14 kg.	30.08 kg.	32.77 kg.	32.00 kg.

No. 475 is 0.71 kg. below normal weight (without clothes) for his sitting height[9]. (The clothes would increase the deficiency, but the weight is taken eight months earlier than the sitting height and probably neutralizes the error.) For his age his sitting height is 8 mm. too short and his weight 0.77 kg. too much. On these figures this boy only exhibits a small deficiency as regards sitting height and a small excess as regards weight; it must be remembered that he has received very careful nurture all his life. According to Whipple's figures[8] No. 911 (the normal occlusion boy) is 9 mm. taller and 2.06 kg. heavier than the standard; it may be said that, according to these figures, he has slight advantages over his brother,

their power to counteract. There is only one year and seven months difference in their ages; their environment has been the same. Their detailed history is given in Table I.

Unfortunately these boys have not been tested with Friel's dynamometers,[4] nor have their heights, weights, chest capacities, etc., been compared,

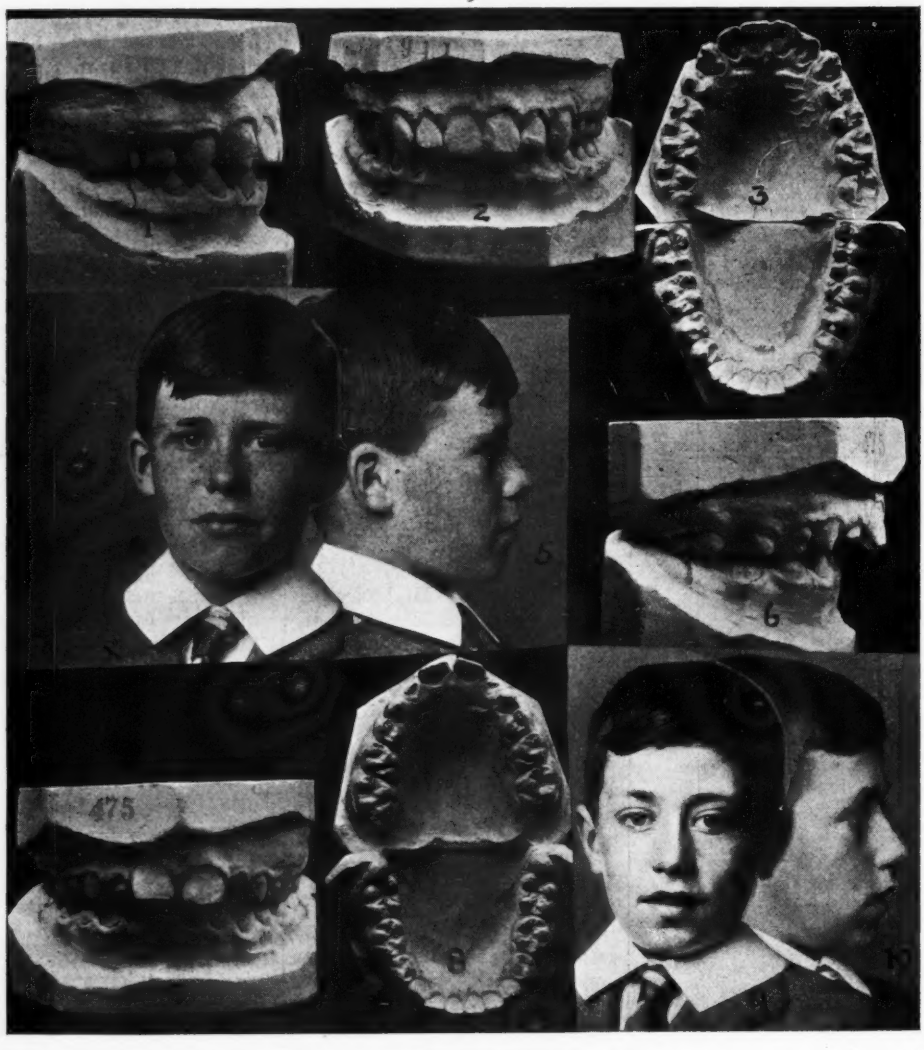


Fig. 1.—Case No. 911. Right side in occlusion.
Fig. 2.—Case No. 911. Front view in occlusion.
Fig. 3.—Case No. 911. Occlusal view.
Fig. 4.—Case No. 911. Right profile (photograph).
Fig. 5.—Case No. 911. Full face (photograph).
Fig. 6.—Case No. 475. Right side in occlusion.
Fig. 7.—Case No. 475. Front view in occlusion.
Fig. 8.—Case No. 475. Occlusal view.
Fig. 9.—Case No. 475. Right profile (photograph).
Fig. 10.—Case No. 475. Full face (photograph). The photographs of Case 475 were taken three and one-half years after treatment commenced. The lips do not yet function correctly.

as is desirable, but in the writer's mind there is no doubt, after making allowances for the difference in age, that the elder brother would in all these physical respects be the superior of his brother.

The British Society for the Study of Orthodontics has asked its members to take part in an investigation of this subject and has drawn up two questionnaires, one of which is to be filled in by the parents and the other by the dentist, for each family examined. The questions are more numerous than those in the case of the boys reported on in this paper. It is expected that a copy of the questionnaires will be published in the *Transactions* of the British Society for the Study of Orthodontics, 1925.

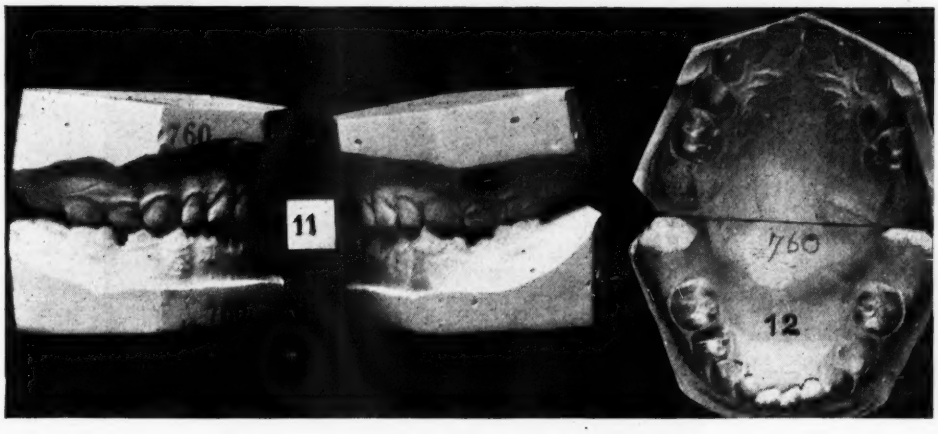


Fig. 11.—Case No. 760. Girl aged six years and seven months. Class I. Approximal caries of $\frac{d \mid d}{d \mid}$; slight medial movement of $\frac{\mid d}{d \mid}$ has already occurred. (See also Fig. 12.)

Fig. 12. Same case as Fig. 7. Occlusal view. All cavities should be filled with fillings suitably contoured. $\underline{\mid d}$ space should be preserved.

Fig. 13.—Girl aged six. Class I. N.B. $\underline{\mid d}$ space; this tooth has been recently extracted.

THE NECESSITY OF EXTRA FUNCTION IN RETENTION

Lantern slides were shown of the photomicrographs which illustrate Oppenheim's two papers[5, 6, 7] on the changes in bone as a result of moving teeth. Briefly, the first series of slides[5, 6] showed that normally the bone on

the labial and palatal sides of an incisor is arranged so that the spicules or laminae of bone are vertical; in other words they are arranged parallel to the forces of mastication, which are chiefly vertical. When a tooth has been moved by gentle pressure for from three to six months these bone spicules on both sides are found to have rearranged themselves in a plane at right angles to their original plane and to be horizontal. The same thing may be expressed by saying that the bone spicules arrange themselves to be parallel to the

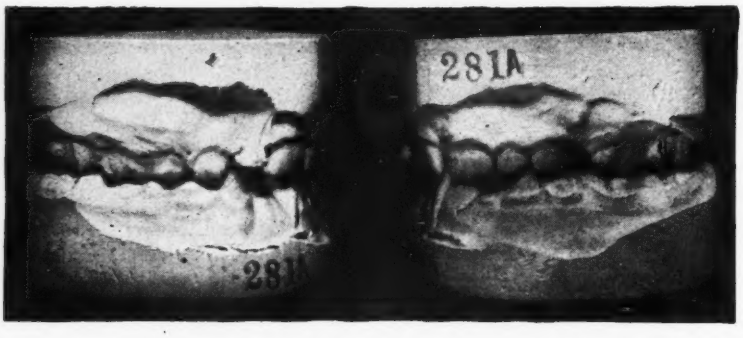


Fig. 14.—Same case as Fig. 9, twenty months later; | e, and with it | 6 has moved considerably forward in this time.

Fig. 15.—Boy, aged ten years and seven months. Class II, Div. 1. $\frac{4\ |}{4\ |\ 4}$ are erupted, no spaces for $\frac{5\ |}{5\ |\ 5}$; this is the condition that arises from the early caries and extractions exemplified in the two previous cases.

forces acting on the tooth. During the movement of these teeth by orthodontic appliances the forces or pressures, developed by means of the appliances, acted horizontally, and the bone spicules rearranged themselves to be parallel to these forces. It is not to be inferred that no vertical pressures are

applied, but in the case of teeth being moved by appliances it is possible that they become of secondary importance; in fact Friel[4] has shown that the vertical pressures which can be exerted by teeth undergoing orthodontic treatment are less than those exerted before treatment started.

These slides were followed by others[7] in which were shown the results of the experiments some six months after the teeth had been retained in their new positions. It was now seen that the bone spicules were reforming themselves parallel to the long axes of the teeth, that is to say in the direction of the more powerful force, mastication (not appliances), that is being applied to them at this time. It would appear, then, that retention depends, among other things, on the reformation of the bone spicules parallel to the long axes of the teeth, and one factor in this process would appear to be pressure ap-

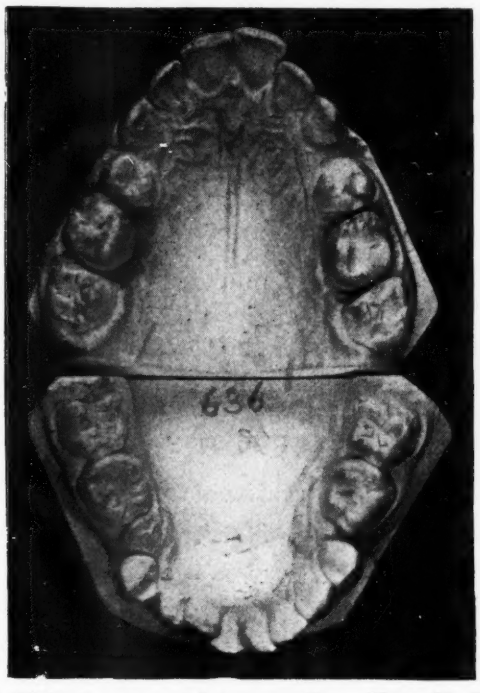


Fig. 16.—Boy aged thirteen years and ten months. Class II, Div. 1. The final clinical condition of the three previous cases; $\frac{|}{5\ |\ 5}$ have erupted lingually to $\frac{}{64\ |\ 46}$ and are shut out from the arch. The position of $\frac{}{5\ |\ 5}$ is so bad that they are not clearly seen and a line has been drawn round their crowns.*

plied to the teeth in a vertical direction; and if these pressures can be applied to a greater degree than is likely in ordinary mastication, may we not expect those spicules to be rearranged more rapidly and more solidly (the latter word is used for want of a better expression). Friel has designed exercisers[4] for this purpose, but I have used rubber in the form of a rubber dog bone (such as is sold in the shops), which is cut lengthways into two or three so as to be a suitable thickness. At the time of retention, or when the appliances are removed, I instruct the child to bite on the rubber in the molar, canine and incisor regions as hard as possible; then the exercise is repeated, but this time the free end of the rubber bone is pulled as hard as possible by

*Figs. 13, 14, 15, and 16 loaned by the British Dental Journal.

the child, i.e., the arm is pitted against the teeth. The exercise is continued an increasing number of times night and morning until, say, fifty of each kind are performed. I am unable to speak of actual results, but I am satisfied that the procedure is a rational one, and I am adopting it in my practice to an increasing degree.

THE NECESSITY OF PRESERVING SPACES CAUSED BY PREMATURE LOSS OF DECIDUOUS TEETH

To illustrate this note a series of slides of four cases were shown, in order to trace graphically the origin of so-called impacted second premolars from a very simple beginning; this beginning is the early caries of the approximal surfaces of the deciduous molars followed by early loss of one or both of these; it is believed that these particular "impactions" arise only in this simple way.

The first case, Class I (Figs. 11 and 12), aged six years and seven months, shows slight medial movement of $\frac{|e}{e|}$ as a result of approximal caries of $\frac{|d}{d|}$.

The next case, Fig. 13, aged six, also Class I, shows the condition shortly after extraction of $\underline{|d}$. Fig. 14 shows the same case twenty months later, when considerable forward movement of $\underline{|e}$ had taken place as the result of loss of $\underline{|d}$; $\underline{|6}$ also has come forward an equal amount. These two cases show how the spaces for $\frac{5\,4\,|\,4\,5}{5\,4\,|\,4\,5}$ are or may be very gradually but very considerably reduced. Preventive treatment should be undertaken to obviate this loss of the premolar spaces as soon as it is liable to occur; if the condition continues unchecked the $\frac{5\,4\,|\,4\,5}{5\,4\,|\,4\,5}$ spaces will be still smaller at nine to eleven years of age, and we may confidently expect there to be room for only *one* premolar instead of for two.

Fig. 15 shows the maxillary and mandibular arches of a Class II Div. 1 case in which there is only space enough for $\frac{4|}{4\,|\,4}$ where the spaces should be large enough to accommodate $\frac{5\,4|}{5\,4\,|\,4\,5}$ (x-rays show that $\frac{5\,|\,5}{5\,|\,5}$ are present).

Fig. 16 shows the final stage of the clinical condition, the eruption of $\frac{}{5\,|\,5}$ entirely lingual to the arch; this is a Class II, Div. 1 case in a boy aged thirteen years and ten months.

It should be noted what serious occlusal results supervene from very small beginnings in approximal caries of deciduous molars. In these cases the parents would doubtless have been willing and eager to have the necessary steps taken to prevent the serious malocclusion which has arisen had the necessity and value of doing so been pointed out to them. A stitch in time saves nine.

REFERENCES

[1]Chapman, Harold: Orthodontics: Investigations in Etiology, Transactions British Society for the Study of Orthodontics, 1925, Dental Record, August, 1925.
[2]Jansen, Murk: Feebleness of Growth and Congenital Dwarfism, Oxford Press.
[3]Jansen, Murk: Some of the Life Properties of Bone Substance, Transactions European Orthodontological Society, 1924, Dental Record, June, 1925.
[4]Friel, Sheldon: Muscle Testing and Muscle Training, Transactions British Society for the Study of Orthodontics, 1924, Dental Record, April, 1924.
[5]McCoy, J. D.: Applied Orthodontia, Kimpton, London, 1922, p. 159.
[6]Angle, E. H.: Okklusions Anomilies der Zahne, ed. 2, Chapter on "Bone Changes" by Oppenheim.
[7]Oppenheim, Albin: Die Veränderungen der Gewebe während der Retention, Wien, 1913.
[8]Whipple, Guy Montrose: Manual of Mental and Physical Tests, Part I: Simpler Processes, p. 67, Warwick & York, Inc., Baltimore, 1914.
[9]Dreyer, G.: The Assessment of Physical Fitness, Cassell & Co., 1912.

DISCUSSION

Mr. Friel said there was one point which Mr. Chapman brought out which was interesting, and that was the exercises to try to stimulate the growth of bone. It was quite impossible to tell what effect those exercises had, but certainly one increased the powers of mastication. The exercises would give the child more confidence, but he did not know of any way of telling whether you had made the bone develop in the proper way except by killing the child and examining sections of the bone.

Mr. Watkin referred to the idea of retaining the spaces when deciduous teeth had to be lost. He had several models he could show where there was no question about it that the malocclusion later on had been caused entirely by the early extraction; otherwise it was a case of Class I and normal development. All the treatment would have been unncessary if, when extraction became necessary, a little prop had been put between the teeth on either side to maintain the spaces until the subsequent eruption of the permanent teeth.

Mr. Cale Matthews said he had only to thank Mr. Chapman for his contribution.

Mr. Northcroft said he would like to have information on one point, and that was the device he used for keeping the spaces open.

Mr. Chapman replied that he was glad to know that Mr. Friel could approve of the exercises from another point of view, which made him feel he was more than justified in adopting that method. As regarded the device for retaining the spaces, he had on a few occasions used a vulcanite plate to be worn at night only. At other times he banded a tooth, preferably a deciduous one, approximal to the space and from it arranged a wire extension to the other tooth approximal to the space. The wire extension is designed to reduce the possibility of displacement to a minimum and not to interfere with teeth that may be erupting.

A COMPARATIVE STUDY OF THREE AMERICAN TEXTBOOKS ON ORTHODONTIA BY ANGLE, DEWEY AND McCOY, WITH SPECIAL REFERENCE TO FINALITY IN ORTHODONTICS*

By A. C. Lockett, L.D.S. (Eng.), London, England

I DO not propose to make a detailed comparison of everything that is written in these books, but simply to touch on what seem to me some of the most vital points on which the successful study and practice of orthodontics hinge, and to see in the light of these comparisons just at what point we have arrived.

As a preliminary to the main comparative study, may I just refer to a few historical events as recorded in one book. In Angle's Preface to the sixth edition he states that the subject, "Orthodontia," is treated far more comprehensively than in the preceding editions which have been limited to the mechanical phases of the subject. The date of this Preface to the sixth edition is October 20th, 1900. I think this date is of importance as the starting point in the author's mind of a broadening of vision, and the basis of the growth and development of orthodontic study and practice. It was in the sixth edition that Angle claimed that occlusion was the basis of orthodontia—1900.

In the Preface to the seventh edition, 1906 (page 9, seventh edition), he states that in 1900 occlusion and art were distinct and independent, but that in 1906 it had been discovered that there was an intimate relation and interdependence between art and occlusion, and that orthodontia had passed from the empirical to the scientific stage.

The last twenty-five years therefore covers a period of time which seems sufficiently long to make a survey of what has actually been accomplished, as far as we know, by men interested in the study and practice of orthodontia. This period ought to serve as a fair test of the application of study in actual practice to show to what extent definite finality of all treated cases is certain, doubtful or impossible.

The writer is convinced: (1) That there is in the minds of all orthodontic practitioners a great deal which ought to see the daylight, and which up to the present has been kept in painful secrecy over too long a period. (2) That an honest confession and statement of these secrets will do more for the practice of orthodontia than an apparent atmosphere of continued bluff and make-believe.

With this conviction and hope of honest confession by all, the writer proposes to examine first these books, to see what justification a reader has for the complaint of being misled, hoodwinked or deceived. An interested beginner in the study of orthodontics, on reading Angle's book, and possibly, Dewey's, is apt to be led away with the first impression that there cannot be any doubt about the certainty of this interesting subject. There is so much

*Read at the Congress of the European Orthodontological Society.

of before and after, and procedure and methods and appliances and attributes of art and associated subjects, that the beginner is apt to overlook any conditions or provisos on which success in finality is going to depend.

I propose to make this interesting comparative study of the contents of these books under four headings:

1. Definitions of orthodontia and early consideration.
2. Treatment.
3. Retention.
4. Writer's conclusions in the light of British experience and British conditions.

Angle's Definition.—Orthodontia is that science which has for its object the correction of malocclusion. He goes on to state in the chapter on occlusion that nature in the normal requires a long period of time—twenty years or more—to build up a complete dental apparatus, and that the normal human denture in its completeness embraces the jaws, alveolar process with peridental membrane, muscles of the lips, tongue and mouth, nasal passages, and palate.

The writer naturally infers from this definition that Angle's view of the duties of an orthodontist is that the successful orthodontist cannot fulfil his duties to each case, carried out in entirety, with occlusion as the basis of his work, for a period of not less than twelve years, when starting a case at eight years of age or of fourteen years if started at six years. I fail to find any reference in Angle's book as to how he applied these duties prescribed for the orthodontist to his own treated and retained cases published in his book, nor do I find any record of a treated case at an age when the dental apparatus as a whole is considered to have reached its full growth and development, nor has it ever been my good fortune to see a published result of any of his finished results five or eight years after the retaining period.

Dewey's Definition of orthodontia is the same as Angle's; in Chapter II he classifies the forces of occlusion and defines those as the factors which, when acting normally, cause teeth to *assume* and *maintain* their positions in the line of occlusion. He makes a bigger feature of these forces than Angle does, and makes some interesting observations in these classified forces of occlusion. He classifies these forces as:

1. Normal cell metabolism.
2. Muscular pressure.
3. Force of inclined plane.
4. Normal approximal contact.
5. Harmony in size of arches.
6. Atmospheric pressure.

He states: (1) That we cannot have any one of these forces abnormal and still have normal occlusion of the teeth. (2) That the writings of Stanton, Hanau and Fish prove that the forces of occlusion cannot be overlooked if we ever hope to establish normal occlusion, from which I infer that unless

these abnormal forces are made normal at the time of their abnormal functioning or during the period of treatment or after actual treatment, a treated case of malocclusion cannot but become again a case of malocclusion sooner or later.

McCoy's Definition.—Orthodontia is a study of growth and development. It seeks to determine the factors which aid in bringing about the normal development of the dental arches and the functional *perfection* of the teeth and their correlated parts, and *aims* to learn the influences necessary to maintain these conditions when once they have been established. There is nothing in common between the two previous definitions and this one. There is a complete absence of certainty in McCoy's definition as compared with the definite statements of Angle and Dewey; yet their definitions are qualified with conditions such as I have already enumerated.

The writer's impression of McCoy's definition is that his ripened experience and disappointments, and consistent observations have driven him to the conclusion that the practice of orthodontia, either as a specialty or in any other capacity, can only be successfully carried out on certain definite lines laid down in his book without a scrap of ultimate certainty as to finality. I think McCoy's definition describes very accurately what is the mental attitude of most men of many years' experience in orthodontic practice. It is a continuous study and an honest well-meant effort to accomplish a definite aim to end in normal occlusion, with the hope and prayer that normality will be a reality in adult life, but with a deep-rooted conviction that it might be in some cases, and that it won't be in others. He is so confident of this fact that he has a chapter on posttreatment requisites which will be dealt with under "retention."

He introduces the biologic problem, and states that although mechanics play an important part in the practice of orthodontia, mechanics is only a means to an end. He believes that corrective measures must be carried to the point where the teeth, dental arches, jaws and their correlated structures are restored to the relationship which will make possible their normal use in the varied functions which they are supposed to perform; that when this end has been attained the final result of a treated case in the language of permanent finality cannot be achieved unless aftertreatment is carried out in a manner which will make the developmental and altered conditions adaptive to the physiologic and functional requirements of the human mechanism as a whole.

McCoy's short chapter on the forces governing occlusion agrees with Dewey's long and important chapter in his book. They both agree that all these forces of occlusion must act and function normally, individually and as a whole, if normal occlusion of a treated case is to remain in perfect occlusion: that the absence of normal function of these forces, and especially the muscles, is the chief factor in producing malocclusion of a treated case in just the same way as they were largely responsible for producing malocclusion before treatment.

He says that any student who fails to consider carefully all the surrounding tissues and their function and relationship to the general plan of occlu-

sion can never hope to practice orthodontia successfully. As this question of forces governing occlusion is so intimately wrapped up with that of retention, we will pass on to the next point to be considered, viz. retention.

McCoy's idea of retention is posttreatment requisites, where necessary, accompanied by mechanical retainers. He maintains that a treated case of malocclusion with the local retaining appliances removed will only remain in normal occlusion when there is perfect harmony of function of all the unfunctional forces which produced the original malocclusion, and that if they have not been restored to function during the period of actual treatment, the duty of the orthodontist is to set about this business of restoration to function until it is accomplished, and he goes on to describe and tell us how this is to be done.

The treatment he prescribes to bring about the normal functioning of all these forces is confined chiefly to muscle training and exercise of all the facial muscles and muscles of mastication (for particulars of which see his book) and to the importance of experienced and competent medical aid in restoring a state of perfect nutrition in the patient.

This feature of muscle exercise and harmony is, as McCoy points out, the result of Dr. A. P. Rogers', of Boston, researches and work, and has become an accepted principle in treatment and retention of cases during the last five years.

Dewey deals with these points in much the same way as McCoy, and they both touch on other factors in retention with which I shall not deal, as they are more or less straightforward in principle and detail.

Angle's view on retention differs from Dewey's and McCoy's on what they consider the vital aspects. He states that the causes of malocclusion must be removed if permanent normal occlusion can be hoped for, and his one recipe in this respect is restoration of function of throat and nose. He maintains that a treated case of malocclusion must be mechanically retained for a sufficiently long period, until all these forces of occlusion have become thoroughly modified in structure and function; he imposes the responsibility on mechanical retainers; Dewey and McCoy impose it on the operator in the form of some definite effort on his part other than by mechanical means.

Treatment.—For the purpose of making this comparative study as short as possible I will not touch on any comparison of the treatment of Class I and Class III cases; it is a generally accepted fact by all students and practitioners of orthodontics that given anything like an ordinary chance of work and opportunity to demonstrate the possibility of achievement in language of permanent finality, the successful and permanent result of Class I cases is the rule rather than the exception; certain precautions in the early treatment of some difficult Class I cases will make treatment comparatively easy, but this is not touched on by any of the three textbooks. Class III cases in treatment and final result are more encouraging than Class II (and subdivisions) which is really the crux of the whole orthodontic problem the world over, and it is with this class I shall deal, and you will find some interesting comparisons here. Angle states on page 58 of his book that out of several thousands of malocclusion cases examined the proportion of Class I to Class II cases and subdivisions is 692 to 266, i.e., nearly four times as many Class I as Class II;

if his examination had taken place in England I think the figures would be four times as many Class II as Class I. This percentage of four to one means in actual practice in England that of 100 cases presented for treatment in the course of time 80 of them will be Class II and subdivisions. If Angle's figures are correct for America, we in England start off with a handicap of four to one—pretty heavy odds.

This is a fact which orthodontists abroad should remember, and they will know other things presently about British practice and conditions which perhaps they did not know before. Dewey and McCoy to a large extent agree on methods, principles and procedure, and all three agree on the long-accepted fact that nasal obstruction, from any cause, must be surgically treated and normal nasal breathing restored, even if nasal breathing exercises are carried out. On page 442 of Dewey's book you find an interesting historical survey of methods adopted in the past and now generally accepted, up to the date of McCoy's book, 1922.

Plan I.—Extraction of maxillary premolars: this plan made the maxillary arch conform to the underdeveloped mandibular arch, the occlusion was slightly improved—no recognition of normal occlusion and normal facial outlines, and it was abandoned for these reasons.

Plan II.—Jumping the bite method introduced by Kingsley: in this method you had apparent establishment of normal relations of the arches and apparent normal occlusion and an improvement of facial outlines. It was found that the objection to this method was the difficulty in persuading the mandible to stay in its forward position, and that the temporomandibular articulation did not make the hoped-for alterations to assist in retention of the mandible in its new position. As neither of these two methods gave the ideal result as a final result, a third method was tried.

Plan III.—With the use of the Baker Anchorage it was found to be possible to move the maxillary teeth backward and the mandibular teeth forward; serious objections to this plan were experienced after a fair trial, viz. there was so much tipping of the teeth in both jaws that normal occlusion could not always be obtained in difficult cases.

Writer's Comment.—The two chief objections to this plan, which most men would expect to be mentioned, are omitted in Dewey's book. They are: (1) Angle, the author of this Plan No. III and also originator of his Classification, committed the serious blunder of compromising his Classification to achieve normal occlusion in what appeared to be a hopeless condition, and by this compromise he knocked the bottom out of his Classification with one stroke of the pen, and left the Classification ship in the open sea without a rudder. His Classification is based on one principle and one only, viz., the maxillary first molar is (according to Angle) the most consistent tooth in the whole denture, and was selected as the point to which and from which all the other teeth in malocclusion arranged themselves; their positions have always been described in relation to the maxillary first molar. Plan III, devised by him, was not only a mistake, but it was a right-about-face of his previous teaching, viz. Plan II in 1905. (2) The second objection to Plan III is the tipping back of the

maxillary first molar into the position intended for the maxillary second molar. This method could not have any but undesirable and serious results, as it established a condition verging on impaction, which, as every general dentist knows, is a very serious one for the patient; a general dental practitioner would never have fallen into this trap.

Dewey says that this Plan No. III gave better and more desirable results than any of the others. Normal occlusion was certainly not always established, and other undesirable features such as a tipping of the teeth and undersized chin and mandible were in evidence. With the hope of overcoming these drawbacks and reaching the long desired result of permanent normal occlusion in all Class II cases, Plan III was altered slightly and became Plan IV.

Plan IV has for its object the establishment of normal occlusion by: (*a*) Widening the maxillary arch and retracting the maxillary incisors, but leaving maxillary molars severely alone. (*b*) Moving mandibular teeth bodily forward the entire distance and making, fitting and adjusting anchorage and appliances in such a way as to prevent tipping of the mandibular teeth, thus bringing them forward in an upright position. I personally would have been prepared to accept Plan IV as reasonably correct, possible and likely to give a final and permanent result, had I not read Dewey's statement of what is accomplished by Plan IV in conjunction with all he has said about forces governing occlusion; his comment is that the facial lines are obtained, mandible develops to normal size, muscular action becomes *normal* and chin develops. The writer's comment on the altered Plan III which is now Plan IV is that it is impossible to move teeth of the mandible forward bodily and in a perpendicular condition with any other device than a fixed and rigid appliance embracing all the teeth on the mandible. The only type of appliance which will do this is just the sort which is undesirable here in England for reasons I shall touch on later.

I think I am right in saying that Plan IV is generally accepted in America as reasonably good, as far as procedure is concerned, but that it does not give the final permanent results without the postretention treatment mentioned by McCoy, and which has been tried for about five or six years with definite reports which have yet to be revealed. Time only will prove whether this treatment with Plan IV will put the last nail in the box containing the secret of treatment of Class II cases and, to some extent, the secret of the practice of orthodontics. If it does, as I hope it will, then the authors of all these plans will have very good reason to be proud of the great and noble fight each and all have made to establish the principle that an ideal is worth working and fighting for, and that no great ideals have ever been achieved in a day or a year, but in a lifetime or more.

There are not many men here in Europe who really know very much about the long years of conflict, argument and disappointment which have taken place in America on this question. It is going on today. The pages 440-444 in Dewey's book only reveal a mere reference to it, but it has been going on in the open, and behind closed doors, at important meetings, and in private conferences among individuals. The conflict and the problem have driven men nearly to distraction: this period of conflict has ranged from 1900 and has grown in severity up to 1920.

About 1916 Dr. Angle appeared to go out of active commission as Captain of the ship Orthodontic in America; I won't say he abandoned the ship, but to all intents and purposes Dr. Dewey, in conjunction with others, seemed to come into the sunlight as Deputy-Captain and Mate and crew, and they appear to have carried on a jolly good fight in a very stormy ocean for a long period. I am sure we wish them all *bon voyage* and a speedy arrival in port with the occlusion secret for certain and for keeps. We do not know how long we shall have to wait, but while we are anxiously waiting someone has arrived in port in another vessel claiming to be the s.s. Orthodontic II with a secret known as "speed" in orthodontics, and rumor has it that the Captain of the said s.s. Orthodontic II is no other person than the old Captain of the Orthodontic I.

The principle of his new teaching is that, inasmuch as he has recorded in the seventh edition of his book that it took the Creator twenty years to make a complete and perfect denture, it is now only going to take him three months to outdo the Creator, and those who feel they ought to follow as nearly as they can the guiding hand of the Creator. It is incidents of this kind and others which I need not relate, which have played such an important part in driving the writer to the decision to write this paper, and examine this subject as he finds it today after twenty years, with the honest object of (1) finding out whether it is ever going to be possible to rid this interesting subject of all this buffoonery, (2) arriving at some basis of standard reliable thought and opinion which will enable us on this side of the water to decide if we are to be followers of thought abroad or to become leaders of thought for ourselves which others can follow if they wish, or think and act for themselves.

THE WRITER'S CONCLUSIONS IN THE LIGHT OF BRITISH EXPERIENCE AND CONDITIONS

It is perfectly clear to me from actual experience, the recorded evidence in these books, and from heart to heart confessions among private individuals of many years' standing in different countries, that normal occlusion in terms of permanent finality in adult life of treated cases is not as common a foregone conclusion as one would expect to find.

There has never been any doubt in the writer's mind—and this has been proved thousands of times over in all countries—that the actual conversion of malocclusion into occlusion is an accomplished fact—easily in some cases, with some difficulty in others—nevertheless an accomplished fact by most men, but the writer soon found this was only an incident in the operation and practice of orthodontics.

A careful reading of Dewey's book establishes an element of doubt which is considerably strengthened on reading McCoy's book. The conditions for successful orthodontic operation, according to their ideas, are clearly set forth in these books for everyone to see, and one of the first questions each man must put to himself on starting the treatment of a case is, "Can I obtain all the conditions which these gentlemen say are necessary in this case?"

First Conclusion.—The present writer's conclusion on this point is that, except for a very small percentage of cases which present themselves for treatment from time to time, all the necessary conditions laid down by these writers are unobtainable in England. The gross handicap of conditions in England as

compared with those in America is a ten to one estimate. I have already mentioned a four to one handicap on class of case earlier in the paper; add to this a second—the national type patient. The characteristic type of English face converted into normal occlusion generally becomes a type all its own, and so much so that parents, friends and relatives of treated cases are prepared to admit the beauty of the results as far as occlusion is concerned at the time of retention, but they are horrified at what you are presenting to them as their son or their daughter: they positively disown it, and no amount of lecturing on the operator's part as to bringing into play forces of occlusion, growth and development in years to come is of any interest to them. God help the man who consistently tries to carry out Dr. Rogers' theories and ideas in an English practice, and heaven help the school-boy who arrives in a dormitory of an English Public School and starts his facial muscle exercises. I am not pouring ridicule on the theory; I wish merely to state that, as a regular thing, it can't and never will be done by the average patients in England. This distressing feature of English conditions is a very real one, and there is a good deal in it from the standpoint of the characteristic English type; this feature does not present itself in treating a child of another nationality unless he or she has lived many years in England.

The next and third great difficulty is the schools in term time, coupled with the natural desire of parents (unless they live in the city or town or very near where the operator practices) to have their children in their homes at holiday time. I need not elaborate this point; everybody knows it, and those who don't, would soon find out if they tried.

The fourth item of difficulty—the question of remuneration—is not the least serious one in the interests of the parties concerned. This problem cannot be considered in the light of the experience of a few fortunate men in London and other large cities in the British Isles; it must be looked at as a national problem.

In a population of forty millions we find some heartbreaking facts which must be faced. There are only five million wage, salary and unearned income recipients who have an income of £250 and upwards, and who are liable for income and super-tax. Of that 5 millions 2½ millions become exempt as a result of allowances for wife and children, etc., i.e., out of 40 millions 2½ millions have incomes somewhere about the £250 figure, leaving the other 2½ millions to pay the income tax and super-tax of the British Isles, which amounted to 659 million pounds last year. Of this figure of 2½ million souls there are only 89,000 people who have incomes of £2,500 and upwards, which means in these days there are only 89,000 possible parents who could undertake treatment such as is prescribed in the textbooks, and these people are scattered over the British Isles. We do not know how many of this number are parents and what proportion of their children need and have treatment, but they are the only possible parents of possible cases which any man could undertake to care for over so many years as laid down in these books. From all these figures we also do know that there are only 2½ millions (less 89,000) earners of salaries who may have children who could have any sort of orthodontia practiced among them, and at the same time give the operator a living

remuneration for his efforts. The remaining 37½ millions—men, women and children—are outside the scope of any sort whatever of orthodontic treatment other than hospital or charity orthodontic practice.

If all these four handicaps—apart from many others unmentioned—don't amount to a total of 10 to 1 handicap, then I have greatly exaggerated the actual position as I have seen it; yet I have been fortunate in not having to experience all of it.

Second Conclusion.—All the recorded evidence in these textbooks having any reference to finality strongly supports the writer's conclusion that the treatment of orthodontic cases in language of permanent finality in adult life of treated cases is a gigantic gamble! In simple cases the operator may win out on having the luck of the gamble; on difficult cases he loses the luck of the gamble and the desired result. The result may be an improvement on the original, but it is malocclusion nevertheless and therefore a failure.

Third Conclusion.—European conditions are so different from American conditions, and so difficult and complicated, that they call for the special consideration and comparison which has been given to them. The writer has expressed already, and wishes again to express, his profound respect for our American friends, their work, zeal and energy, and their good-hearted desire to help us here in Europe. At the same time he wishes to say: (*a*) That if our conditions and problems are to be solved in years to come, they will and must largely be solved by ourselves in our own way. (*b*) That the general dental practitioner's duty is to look at this subject through the eyes of a general practitioner and to contribute suggestions and ideas which will help where the recorded teaching of these books has so far failed to reach a final solution in their own country, much less in Europe. (*c*) That much damage has been done in past years to the best interests of orthodontia through the association of teachings with appliances and materials. We could not have made the practical progress which has been made without these appliances, but the best results of teaching and study will come when it is obvious to the student that the teaching is in the interest of the subject only.

Fourth Conclusion.—There is no branch of our profession in which tutors and operators have worked harder and more consistently to attain a definite ideal than have these gallant men. Nevertheless, in spite of a good deal of success which has attended their efforts, they will, I am sure, admit definite certainty has not yet been achieved, and I wish to make a suggestion which I think will do more to bring about the long looked for day nearer, and it is this: Publish a book, not before and after treatment; but a book of records of difficult class cases five, seven and ten years after removal of retainers, and let anybody contribute. I prophesy that if that book ever sees the light it will be an eye-opener.

I hope I may be forgiven if I have hurt anyone's feelings, but I really wish, as hon. secretary of this Society, to be able some day to say that the European Orthodontological Society has left a mark on the pages of orthodontic history which cannot be overlooked, and that our Society's efforts in years to come have been of some real help to our friends and members on the other

side of the water who have done so much for us here, for which we are deeply grateful. If we find we cannot agree on principles, let us still be friends and comrades, and find joy and happiness in each other's lives and work.

Some definite effort should be made to enable men to face the fact that finality in treatment is either a possibility on certain lines or an impossibility on other lines; we ought not to go on any longer living in hope, fear and doubt; let us take this nightmare of a ghost and drag it out into the open and find a solution if it is to be found.

DISCUSSION

Mr. Cale-Matthews said he felt that Dr. Lockett's paper was very amusing, instructive and tremendously enveloping. Dr. Lockett had touched on practically the whole gamut of our practical everyday work in orthodontics, and he hardly knew how to collect the few thoughts he had to offer either in congratulation or disagreement. The papers he had listened to that day were in many points opposed. We had had a criticism of Angle's classification, and his dogma on the six-year molar was held by many people as a definite and absolute part of his teaching. He continued to hold that Angle had never said that the six-year molar was the key to his occlusion; he only said it was a factor theoretically for the permanent correction of distocclusion cases (Class II cases, as Dr. Lockett had said). He preferred to regard the position of the maxillary canines as the most disturbing cause. The large number of distocclusion cases which were brought to one were complicated by impaction of a second premolar and a contraction of the maxillary arch in the region of the permanent canines, and in those few cases in which he could say he had had continued and more or less permanent success of retention without appliances, was where he had expanded the canines. Another feature which, in his experience made for failure in the treatment of these cases, was being satisfied with the minimum of treatment and expansion, and he thought it was wise to err on an excessive amount of room in that type of case rather than be satisfied with having obtained perfection of occlusion and leaving it at that. By overdoing your treatment you provided for a certain amount of relapse. Another feature for retention of that particular case—and again he said it was the only class of case in his experience which was automatically retained after the removal of appliances—was where you had a well-formed premolar, where your cusps were sharp and would maintain your occlusion on the inclined plane. As you could not rely for permanence of retention on the molar, of course it was failure in that Class II case. He cared not what appliance a man used—that was a matter for individual choice; he did not mind how long he took within reason to get his result, but what he did ask was that he should endeavor to eliminate theoretic talk and deliver the goods, and if he delivered the goods it mattered not by what means, provided he injured as little as possible, and that there was a prospect of the child's eventually being benefited, both in its health and appearance by the treatment. On the other hand, he thought it was perfectly justifiable to regard the patient's appearance as being not only a factor, but possibly an infinitely greater factor in the minds of those people Dr. Lockett refers to so sympathetically—the parents—than is the occlusion. He had never forgotten three years ago the President himself occupying two or three minutes of their time, when he showed on the screen three photos of a girl with marked prominence of the maxillary incisors and recession of the mandible, and it was possible from these photographs to visualize the teeth lying within those lips, and that he thought was what we should all do; there must be a certain amount of idealism about our work. He had never forgotten about those photographs; it was a lesson to him and a standard to aim at. There were both the appearance and occlusion to think of, and although one must not sacrifice the occlusion for the appearance, he often felt justified in having slight distocclusion if the appearance and functioning were useful.

Mr. Badcock said he thought from the applause accorded to Mr. Lockett's paper members must have agreed with a great many of his points. He thought they all had disappointments and found that cases they had treated, and thought they had treated quite successfully, relapsed in after years. Experience, he thought, had led most of them to believe that treat-

ment should be carried out a good deal earlier than it used to be years ago. His own experience had been that when treatment had been delayed until the premolars had erupted, there was a very great likelihood to relapse afterwards, and he thought we had to take into account, as Mr. Lockett had mentioned, the forces which caused the malocclusion; and if we merely contented ourselves with rearranging irregular teeth in a regular arch, without having done anything to alter the causes which made them irregular originally we should be pretty certain to get a relapse, and that was one of the reasons that treatment with judicious extraction was often much more useful in its permanent result than treatment without, because one of the factors—and usually he thought the greatest factor—in malocclusion was lack of growth. Now up to the present, so far as he knew, we had not succeeded in stimulating growth, at any rate to a very large extent, and until we did that he believed we were, in a large majority of cases, doomed to failure unless we reduced the number of the teeth in some way, and after all our ideal should be, he thought, what Mr. Cale-Matthews had said—a double ideal—good appearance and perfect functioning. If you took a large number of Angle's Class II, Division I or II, you would find they were perfectly functioning as far as chewing was concerned, and he found in many of these cases he could treat them quite successfully, with excellent appearance, and give perfect satisfaction to the patient and his or her friends, by judicious extraction, and of course treatment afterwards. He was not advocating extraction in every case, but the thing which did impress itself on his mind was that unless you altered the conditions in some way which caused the malocclusion you could not correct it, and of course in those Class II cases the great thing was to get the incisors under the control of the lips. Many years ago he had had the privilege of being associated in practice with Mr. Visick, and he remembered two cases which he treated by what Mr. Lockett had called Plan III, and both those cases were in perfect occlusion today. They were excellent examples of successful cases treated on those lines without any extraction—both Class II, Division I. He must add that in one of them he was not sure the patient's appearance would not have been better had he been treated by the extraction of the premolars rather than by keeping all his teeth, because he did look a little toothy; but from a technical point of view the result had been satisfactory.

Dr. Quintero said he thought it took a certain amount of courage for any man to stand up before a meeting like that one and say that orthodontia was not always a success, and he thought they owed a great debt of gratitude to Dr. Lockett for giving them that paper. He thought there was not sufficient stress laid on diagnosis in the textbooks. They were told a lot about treatment, a lot about classification, a lot about etiology, but very little about diagnosis. He thought it was a great mistake, because if you made a faulty diagnosis your treatment would be wrong, and if your treatment was wrong your result would be wrong. That was why he heartily agreed with both Mr. Cale-Matthews and Mr. Badcock in what they had said. The facial appearance of the patient was one of the most important points one had to deal with, and if they were not given a proper facial appearance in the final stages of treatment, one had not done the right thing by them, and he thought that could be attained by judicious extraction in certain cases. On the other hand he could not agree with all that had been said about Class II cases, because to his mind Class II cases comprised a variety of conditions which were not all described in that single term "Class II," or distocclusion or postnormal cases, because in Class II cases we could have a number of things which were entirely different; for instance, we could have the mandibular arch posterior to normal and the maxillary arch normal, or we could have the mandibular arch in its normal relationship, while the maxillary teeth were anterior to normal, or we could have both conditions combined, or any sort of combination of those conditions, so that each of these cases required an entirely different kind of treatment, and we could not treat all of those conditions in a similar manner. Finally, there was one point which had been passed over entirely, but he did not think it was mentioned in Dr. Lockett's paper, and that was the vertical movement of the teeth. He thought that without the vertical movement of the teeth we could not expect to have proper retention in what had been termed Class II, Division I cases; in such cases where we find retrusion of the mandible with protrusion of the maxillary anterior teeth we almost always had an elongation of the mandibular anterior teeth, and if that elongation were not properly corrected we could not have a permanent result. Therefore, he thought the problem was one of three dimen-

sions, not only a problem of proper expansion, not only a problem of proper anteroposterior relationship of the jaws, but also a problem of the proper vertical relationship of the jaws.

Mr. Campion congratulated Mr. Lockett on his paper; it was one of the finest he had ever heard. He thought a great deal of the trouble was that we had not diagnosed our cases at all; we had only diagnosed the occlusion; we had not diagnosed the bodily conditions or the osseus conditions or the muscular conditions, and he thought the reason we had had so many failures was that we had been trying to treat the symptoms and not the disease, and expected to give a child normal occlusion who was not fit to have normal occlusion. He thought if a child was not fit physically it must be treated by a physician to have any hope of normal occlusion, and that the same applied to the muscles and all the general physical conditions. If the lips did not function properly one had to exercise them and make them normal.

Dr. Friel said he had no doubt in his own mind that the size of the tongue must control the shape of the arch because in the experiments he had made with dynamometers children who had powerful tongues also had wide arches, and although the children with weak tongues did not always have narrow arches, you never saw a child with a strong tongue and a narrow arch. With dynamometers it was made possible to get a child to give its full pressure. Another thing about tongues was that all weak tongues were not small—they might have a good deal of fatty tissue which would make the tongue large, as in children with thyroid deficiency—very large tongues, and teeth all spaced; so he thought to get teeth to be retained you must have the tongue increased in strength, and he thought the only method was to give it proper exercise.

Mr. Visick said he had enjoyed Mr. Lockett's paper immensely; it had been quite refreshing. It seemed the thing was still a burning question with Mr. Lockett. He used to have heartburnings himself about those Class II cases, but he didn't get hot about them any longer; he took the line of least resistance and nearly always extracted the maxillary first premolars. He had not actually tabulated his cases, but just casually he should think nineteen out of every twenty would be Class II cases. In Class II cases he thought one was not justified in telling the parents one could get a permanent result without extraction; he knew it sounded awful, but that was the result of Mr. Badcock's experience as well as his own experience of twenty years. He had not tried Plan IV; he did not think it was practicable in an ordinary practice in England, where children were away three or four months in the year, so that in Class II cases he had practically given up telling parents—as in years gone by he used to tell them—that there was another method of treatment extending over two or three years (not months), that it was a very expensive, a very long treatment, and personally he would not have it done to his own child. Nowadays he did not even tell them that in most cases. Sometimes one came across a case where it was possible to keep all the teeth, but in most cases the extraction of the maxillary first premolar on either side, and especially with expansion of the mandible, he found a result was quickly obtained—not so quickly as Dr. Angle's with the ribbon arch—and although he did not say it was perfect, yet it was pleasing and useful and something the parents could afford.

Dr. Barrows said he could not quite agree with the last speaker. He thought the extraction of the first premolars if done in a comparatively young patient meant that you could never get proper development of the face. He thought the teeth were put there for a purpose, and if we could give them their proper lines the child's face developed and you obtained a more pleasing effect from the keeping of the thirty-two teeth than if you took two teeth out of one arch and left the other to itself. He must say from all the models he had seen of cases treated the effect was more ideal when all the teeth were present than when some were extracted.

Dr. Hipwell said he agreed with Dr. Barrows and not with the other gentlemen; he was going to fight and say just what he thought. His opinion was that if one had patience and obtained more knowledge, took more time, charged the patient a little bit more, and realized what one could accomplish with patience and skill, the results one wanted could be achieved without extraction. Now, if one talked to the orthodontist of America about extracting the first premolars he would say: "You had better have another course." Where

cases of Class II without extraction looked a bit too full—give the child three months of normal functioning of lips, nose and cheek, and when you get normal functioning of all those muscles it would not look so much "all teeth."

Dr. Lockett replied that there was one apology he would like to make before he touched on any of the points which had been raised in the discussion. He honestly felt it did not seem a fair thing to read a paper as he had done, making a comparison of three textbooks, without giving the authors of those books an opportunity to be present at the meeting to express their opinions and to criticize or agree, but at the same time he knew that was impossible. He was so interested in the subject, as far as clearing it up in his own mind was concerned, and he was sure there were a great many other men who would like to have a clearly established point of view as to whether finality was possible under any conditions—favorable or otherwise. If he went to America next year to the Congress, he was going to ask permission to read a paper on that subject, and he would be prepared to send a copy of that paper to Drs. Angle, Dewey and McCoy, if he were allowed to read it at the Congress, and give them an opportunity to go there and discuss it. He had been told he would probably be skinned alive. He was prepared to take his medicine, but there would be more than one man skinned before the sun set. He would like to say the subject of the paper was simply the establishment of finality in adult life of treated cases, and if he did not reply in detail to all the points raised he hoped the gentlemen present would not feel they had been slighted. One or two points had been brought up, for instance, other than those raised in regard to different methods by extraction or otherwise, the point raised by Mr. Badcock as to some cases thought to have been successfully treated relapsing in after years. That was just the trying point about the whole subject. We had all had cases treated in Class II which were today in normal occlusion; they were in existence in all parts of the world; but at the same time there were a good many cases which had been treated on much the same lines by different men which were not a success so far as normal occlusion was concerned, and occlusion was the basis of the teaching. Dr. Quintero raised the point that he thought it was possible some of the cases had failed because they had not been properly diagnosed; it might be possible, but with the opportunities and knowledge one had as to diagnosis, he could not himself express an opinion as to whether that would solve the problem. If it was diagnosis, he said, "let us find out what it is and get back to normal occlusion and stay there. I want to stay on normal occlusion even if it means the split-pin and ribbon arch." If Dr. Angle had sent us a case ten years after treatment and said this case had been treated with those appliances shown here, then he is the man we are looking for in Europe, and if anybody will come from any part of the world with a solution of this problem, I am certain we will all give it a trial; it takes a whole part of one's lifetime to prove a thing or disprove it. There appears to be a general spirit of unanimity amongst the gentlemen who have spoken; Dr. Barrows and Dr. Hipwell have differed slightly. I am not going to disagree, but would like to draw your attention to two or three things; this uncertainty as to results is not confined to England—there is a great deal more in America than people realize. Here is a statement by our old friend, J. Lowe Young: "It is doubtful if children once affected by lack of growth to an appreciable degree ever overcome such a defect." It can only mean that after twenty-five years of practical experience he has come to the conclusion that it is a doubtful thing to be able to promise results. If you cannot promise results, how are you going to deliver the goods? I have simply taken this question up because I feel the day has come when we ought to understand ourselves more clearly in the light of the conditions of the countries in which we practice. I am perfectly certain that, so far as England is concerned, there are at least 80 per cent of the population to whom the treatment as laid down in these books is not applicable to the conditions and remuneration.

CONFERENCE

REPORT OF DR. ALFRED PAUL ROGERS' CONFERENCE ON ORTHODONTIC TREATMENT EMPLOYING THE USE OF MUSCLE EXERCISES*

DR. ROGERS presented to his audience from thirty to forty cases representing all of the various types of neutral, mesial and distal occlusions in sufficient variety in each division to cover a wide range as respect to age. The cases under observation were all treated by the minimum use of apparatus with the maximum use of those forces of occlusion developing through the function of muscular tissue. Dr. Rogers emphasized the possibility of treating many cases of neutroclusion by the use of one appliance only, and that attached usually to the lingual aspect of the mandibular arch. His clinic also demonstrated that the long continued use of apparatus for retentive purpose may be greatly limited by the proper development of muscular function with its attending balance.

Many of the models used for illustration were those from which illustrations have been made during several years past, and which have appeared in the following articles written by Dr. Rogers on this subject:

"The Development of Occlusion." Published in the International Journal of Orthodontia, June, 1918, iv.

"Exercises for the Development of the Muscles of the Face with a View to Increasing Their Functional Activity." Published in the Dental Cosmos, October, 1918.

"Muscle Training and Its Relation to Orthodontia." Published in the Dental Items of Interest, 1919, xli.

"Teaching Our Patients to Overcome Undesirable Muscular Habits." Published in the International Journal of Orthodontia, August, 1919, v.

"Psychology in Its Relation to Practice." Published in the Journal of the National Dental Association, August, 1921, viii.

"Stimulating Arch Development by the Exercise of the Masseter-Temporal Group of Muscles." Published in the International Journal of Orthodontia, February, 1922, viii.

"Dento-Facial Maldevelopments and Their Correction." Published in the Archives of Pediatrics, March, 1922.

"Making Facial Muscles Our Allies in Treatment and Retention." Published in the Dental Cosmos, July, 1922.

"Co-ordinating Natural and Artificial Methods of Treatment." Published in the International Journal of Orthodontia, February, 1924, x.

"Simplifying Orthodontic Treatment." Published in the International Journal of Orthodontia, June, 1926, xii.

*Given before the First International Orthodontic Congress, New York City, August 16-20, 1926.

Clinics

CLINIC*

Class I (Neutroclusion) Impacted Maxillary Canine with Forward Drift of Maxillary Right Molars and Premolars, Simulating a Class II Subdivision Case. (1) Maps of the malocclusion. (2) Axis of symmetry and centroid of denture. (3) Maps of proposed occlusion. (4) Composite maps of maxillary and mandibular showing the malocclusions related to the occlusion to show the minimum tooth movement to change from malocclusion to occlusion. (5) Photographs of models at various stages. (6) Drawings of the appliances.

By Dr. Frederick Lester Stanton, New York City
Professor of Preventive Dentistry, New York University College of Dentistry

Illustrations and explanatory legends follow.

*Given before the First International Orthodontic Congress, New York, August 16-20, 1926.

Fig. 1. Fig. 2. Fig. 3. Fig. 4. Fig. 5.

Figs. 1-5.—The top model is the original model taken in February, 1921.
The middle model was taken in December, 1922.
The bottom model was taken in November, 1925.

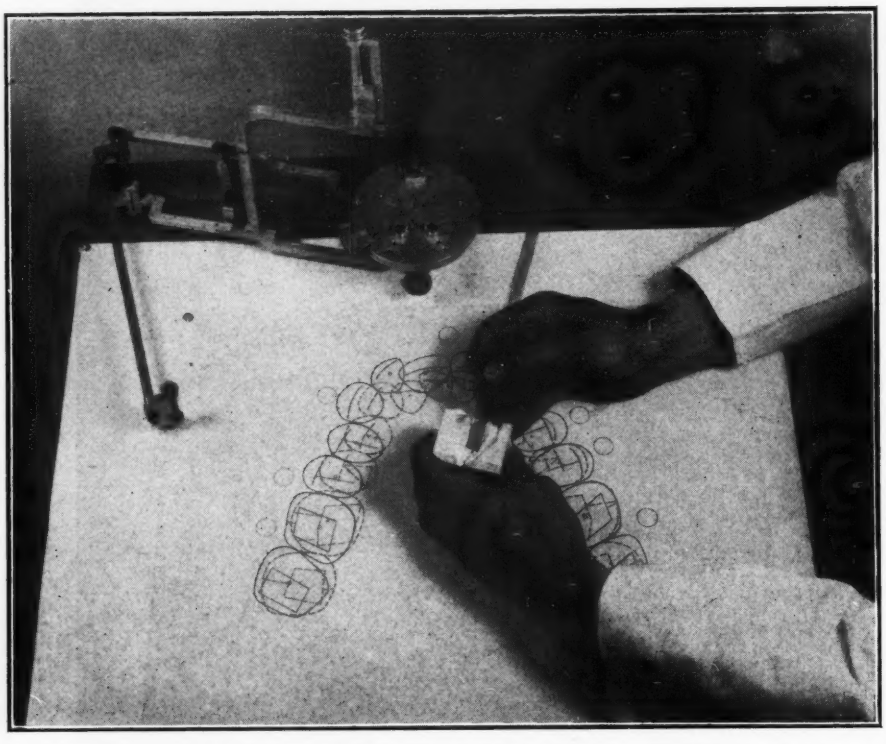


Fig. 6.—Method of determining occlusal plane. Leveling model.

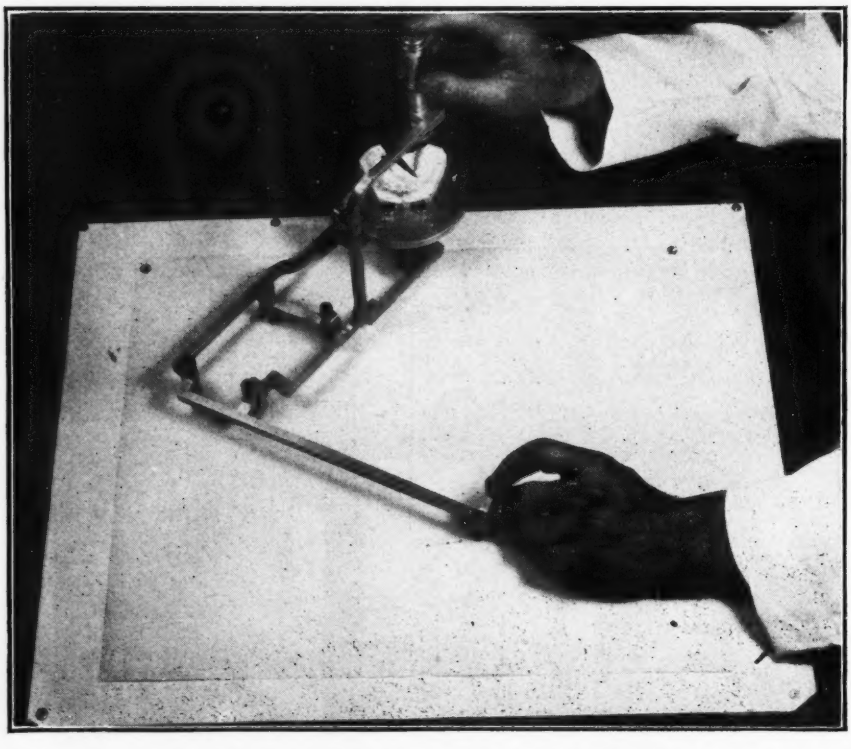


Fig. 7.—Orthographic projection of model. Enlarging five to one.

Fig. 8.—Mandibular model locked in surveyor with maxillary model in malocclusion. Center of circles are maxillary points, on a plane, projected to lower map.

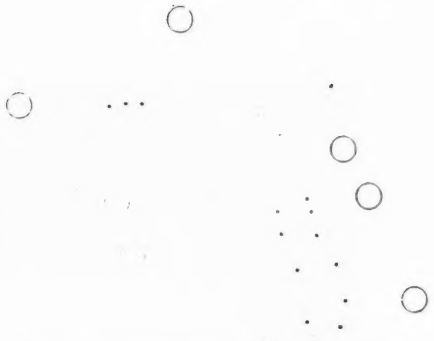


Fig. 9.—Maxillary model removed. Start of survey of mandibular model. Surveyed points are cusps of right mandibular first and second molars, also left central. Circles registration points of maxillary model on lower map.

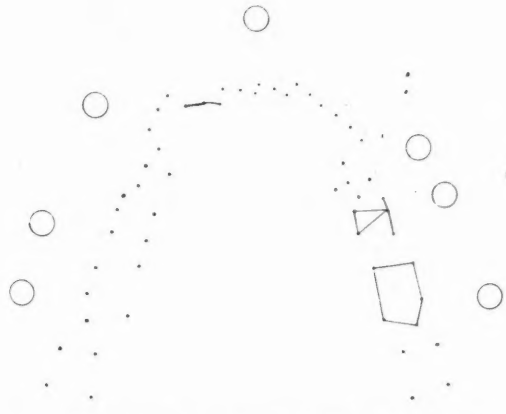


Fig. 10.—Cusps and incisal edges of all mandibular teeth projected. Cusps of mandibular right first molar and second premolar connected with lines, also incisal edge of left lateral.

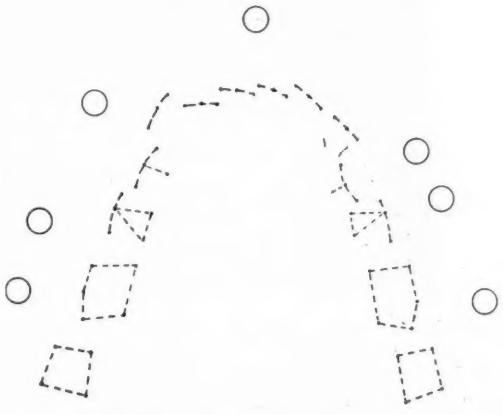


Fig. 11.—Complete survey of cusps and incisal edges of mandibular teeth.

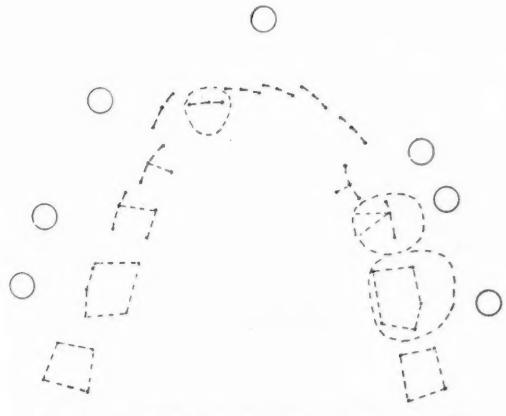


Fig. 12.—Start of survey of gum outline.

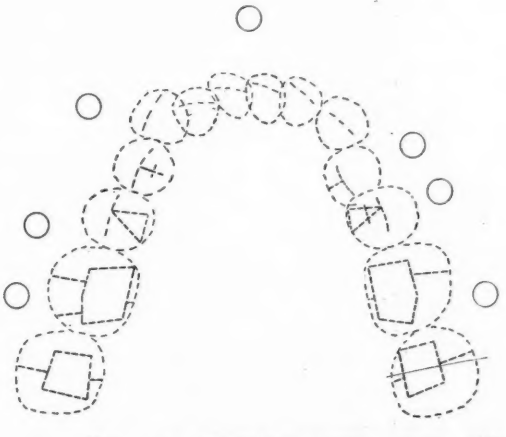


Fig. 13.—Complete lower map with circles of registration projected from maxillary model.

Fig. 14.—Mandibular model has been removed from surveyor and replaced by maxillary which has been leveled on the plane of the registration points. The circles are the projected registration points of the maxillary model to the upper map. Cusps of maxillary left second molar and second premolar are shown, also incisal edge of left lateral.

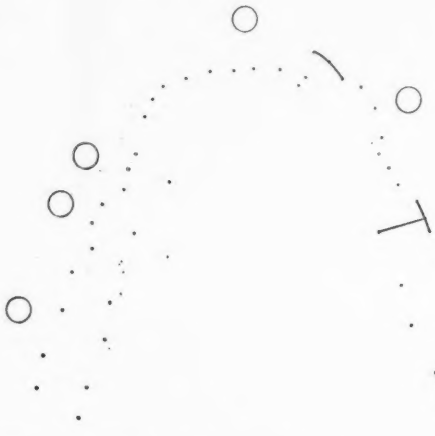


Fig. 15.—Upper map of all cusps and incisal edges.

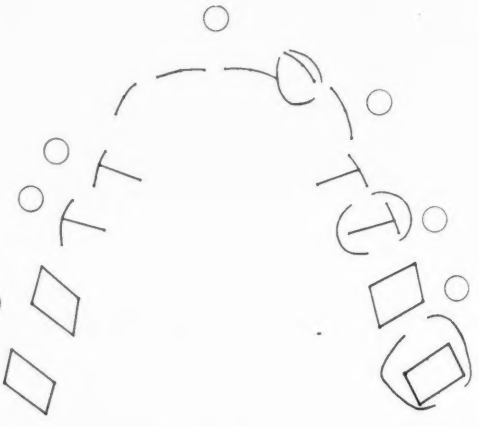


Fig. 16.—Start of the survey of the maxillary gum lines.

Fig. 17.—Upper map complete. Contacts left open in order to precisely check the most important measurements—the mesiodistal diameters.

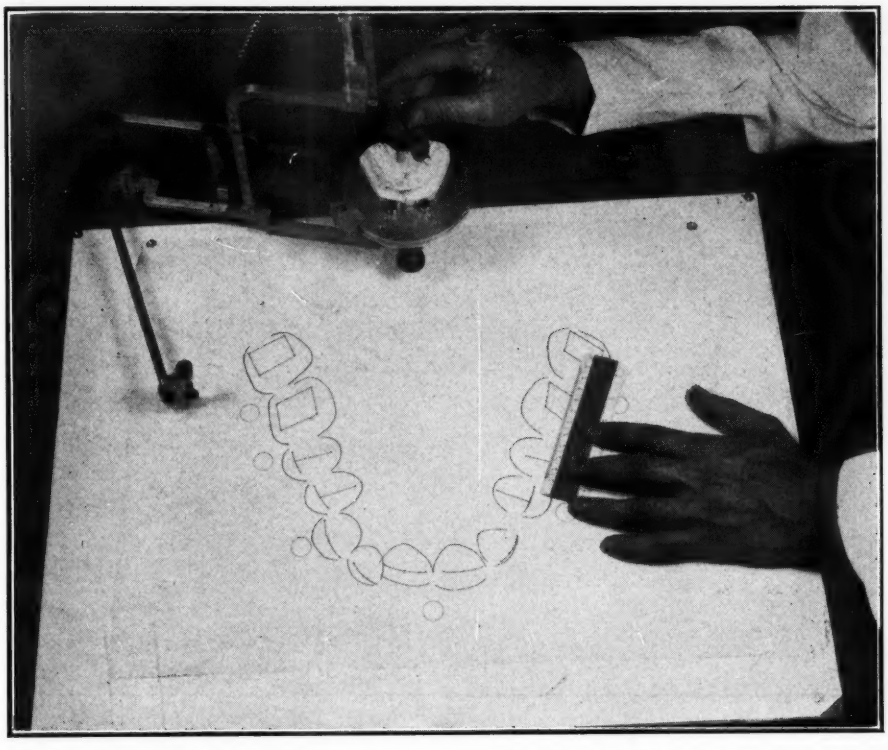


Fig. 18.—Method of measuring teeth on map and model in order to insure correct mesiodistal contacts.

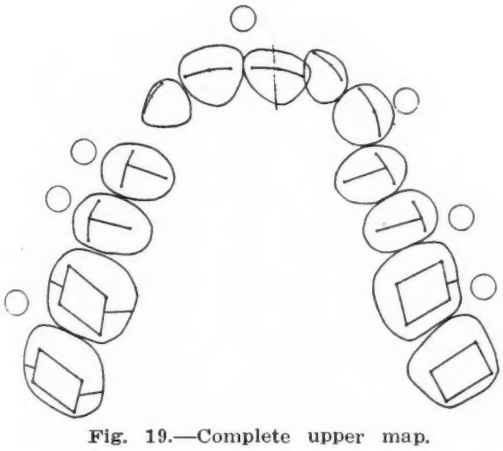


Fig. 19.—Complete upper map.

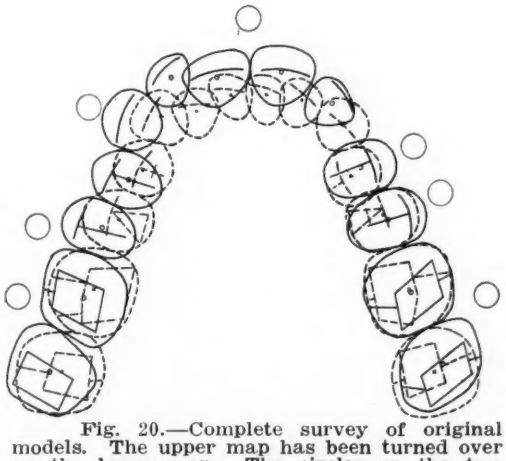


Fig. 20.—Complete survey of original models. The upper map has been turned over on the lower map. The circles on the two maps having been placed in registration, the composite map of malocclusion is traced. The centroids of all teeth have been marked.

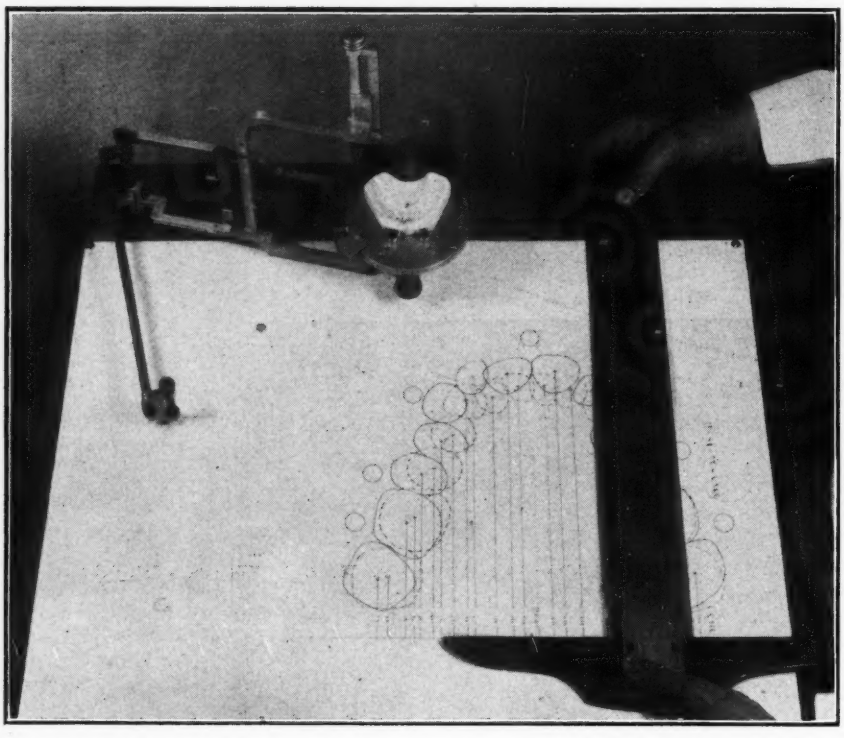


Fig. 21.—Method of computing centroid of denture with a calibrated T-square.

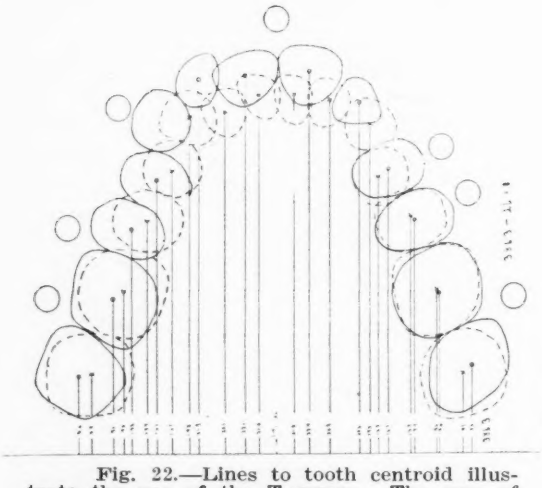


Fig. 22.—Lines to tooth centroid illustrate the use of the T-square. The sum of these distances is divided by the number of the teeth. The average is marked on the map. This process is repeated from any two other bases. Where the average lines from the three bases cross is the centroid of the denture.

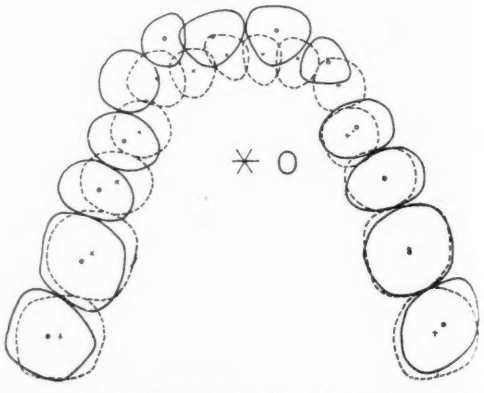


Fig. 23.—Centroid of denture the point where the three lines intersect.

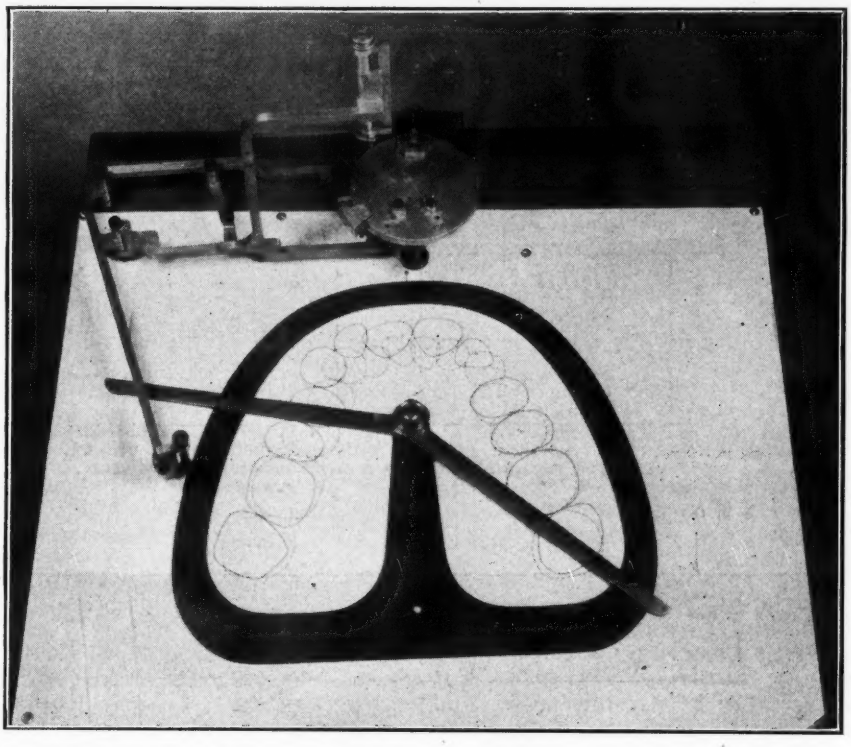


Fig. 24.—Protractor placed on map of malocclusion. A pin passes through protector center and centroid of denture. With the movable arms the angles and lengths of the vectors are read. (Vector-line connecting centroid of denture and the tooth centroid.)

Formula for the Axis of Symmetry

	2	3	+	−	5	6	7	8	Explanation of Formula
1	130	150	20		78	74	577	-1154	Col 1 Number of paired teeth
2	400	340	60		77	85	654	3924	Col 2 Vectorial angle of right centroids
3	720	810		90	70	73	511	-4599	Col 3 Vectorial angle of left centroids
4	960	1020		60	84	88	739	-4434	Col 4 Column 2 minus column 3
5	1180	1210		30	111	113	1254	-3762	(equals difference in vectorial angle of homologous teeth)
6	1280	1310		30	152	156	2371	-7113	Col 5 Length of right vectors
7	90	100		10	63	62	390	-390	Col 6 Length of left vectors
8	270	300		30	67	60	402	-1206	(a vector is a line from denture centroid at 0 to tooth centroid)
9	500	480	20		71	71	504	1008	Col 7 Product of column 5 by column 6
10	750	750	00		63	65	409	00	Col 8 Product of column 4 by column 7
11	950	1000		50	82	77	631	-3155	(-3004 5 = total of +values and +values of column 8 Total of column 8 is divided by total of column 7 and the answer is 2.62 (correction for axis))
12	1170	1210		40	110	106	1166	-4664	$\frac{-3004\,5}{1155\,8} - 2 = -1\,2°$
13	1310	1330	20		150	150	2250	-4500	
							11558	-34977	± = assumed axis moves contra clockwise
								4932	+ assumed axis moves clockwise
								-30045	

Fig. 25.—Formula for axis of symmetry. Vectorial angles and lengths as read with the protractor are used as shown in the formula.

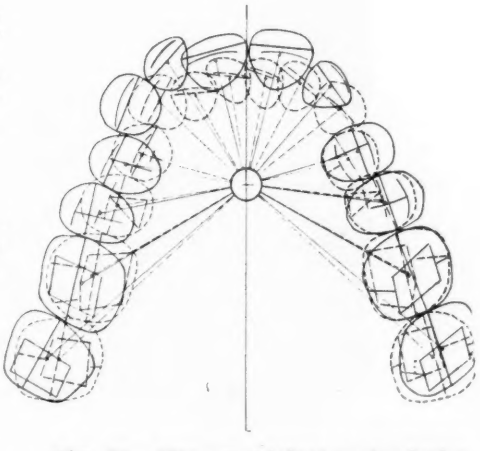


Fig. 26.—Map of original malocclusion. Centroids of teeth. Centroid of denture. Axis of symmetry. Vectors.

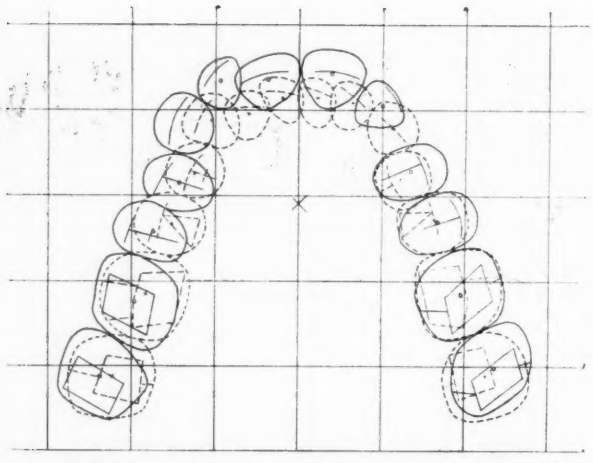


Fig. 27.—The map (Fig. 26) has been covered with a transparent sheet ruled in squares. Midline registered on the axis of symmetry.

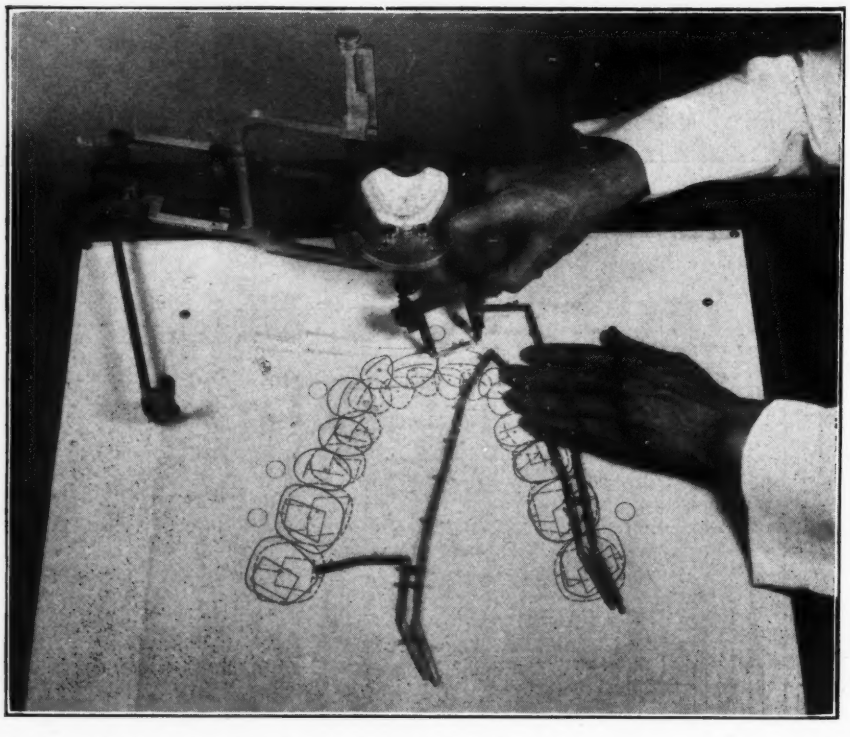


Fig. 28.—Method of measuring occlusograph links by means of caliper square that is set for each tooth, five times the length of the mesiodistal diameter. Each adjustable link is locked to represent the mesiodistal diameters.

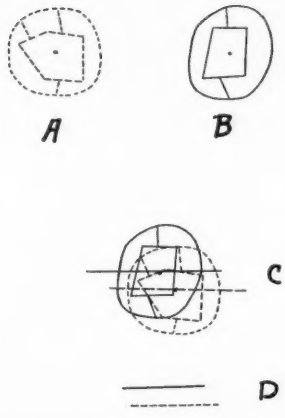


Fig. 29.—Method of determining the way to lock occlusograph at the first molar to insure correct buccolingual and mesiodistal relations (normal occlusion of first molars for this patient). *A*, map of mandibular first molar. *B*, map of maxillary first molar. *C*, maps of molars fitted in normal occlusion. *D*, contact lines used for locking occlusographs.

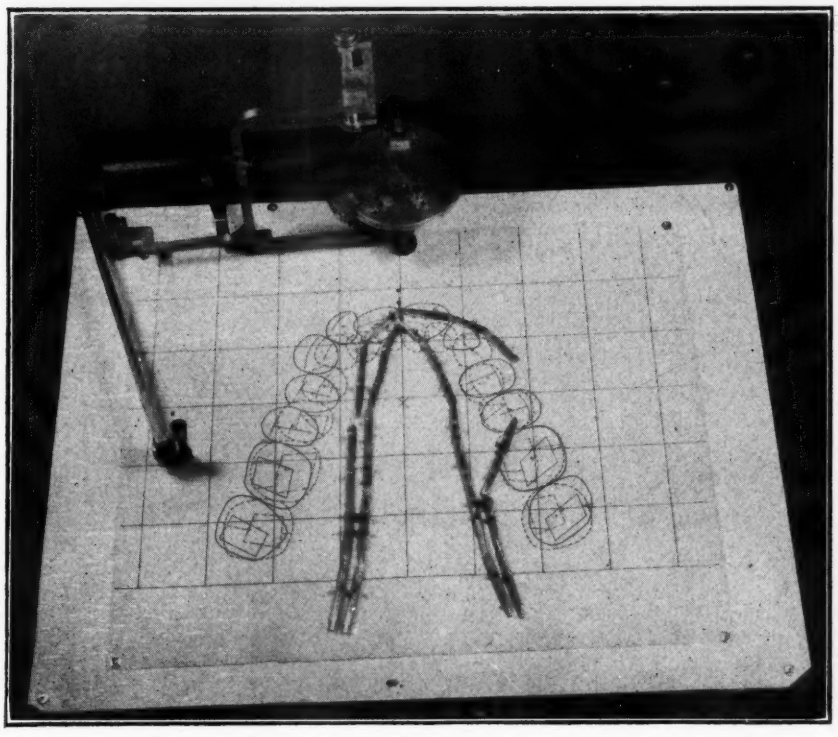


Fig. 30.—The occlusograph is tacked in incisal region on a transparent sheet of paper over the map of malocclusion.

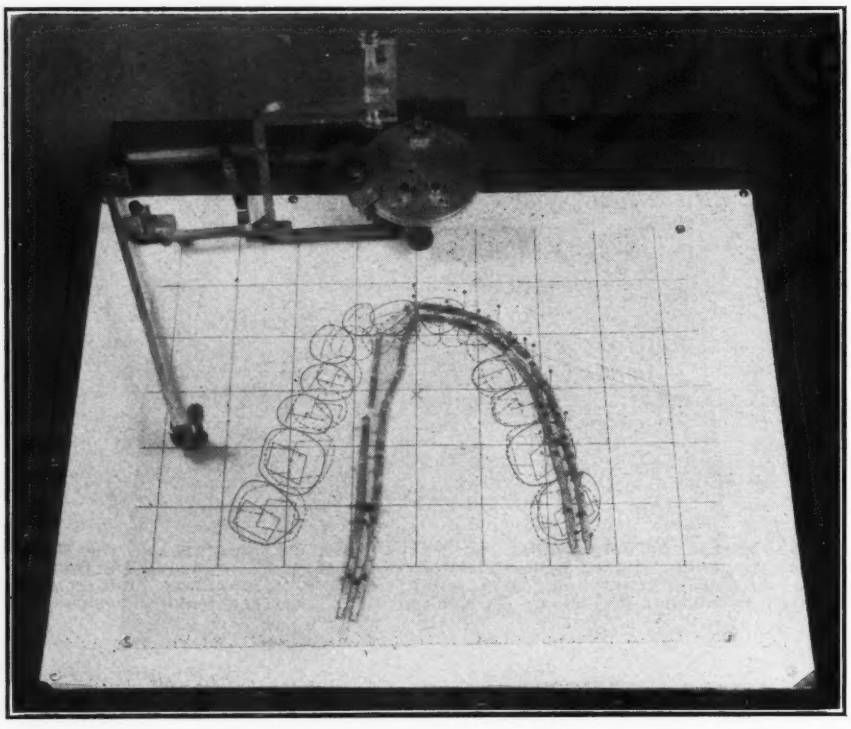


Fig. 31.—Occlusograph adjusted on the right side so as to produce the nearest normal arch to the malocclusion.

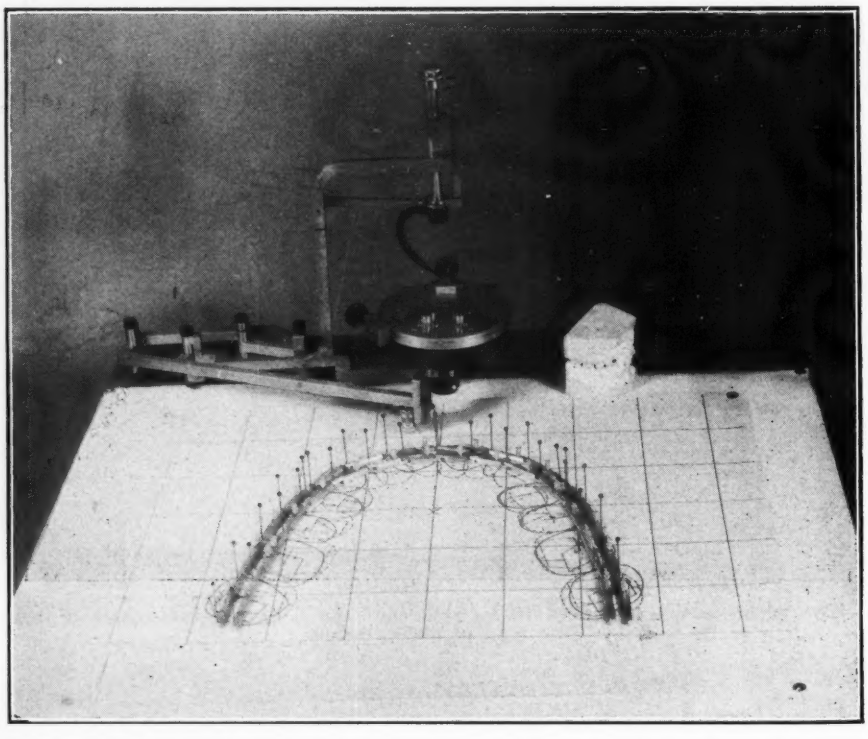


Fig. 32.—Occlusograph arranged and the pins placed through the contact points.

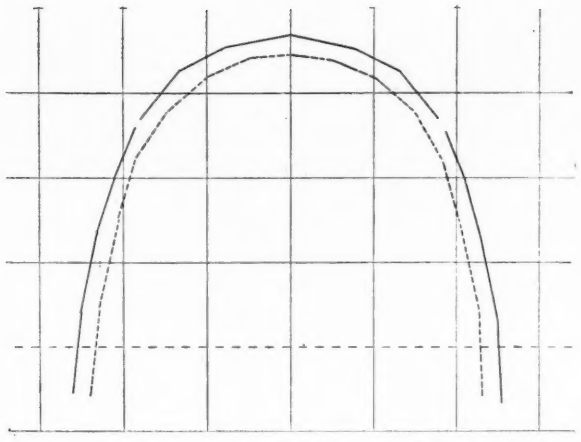


Fig. 33.—Occlusograph removed and the pin points connected showing the form on which the map of occlusion may be constructed.

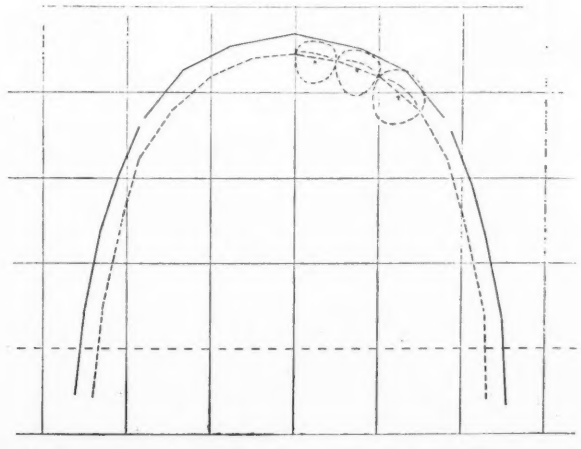


Fig. 34.—The transparent map with the occlusograph lines has been moved over the malocclusion map and three mandibular teeth have been drawn in. (All abnormal rotations must be corrected in each tooth.)

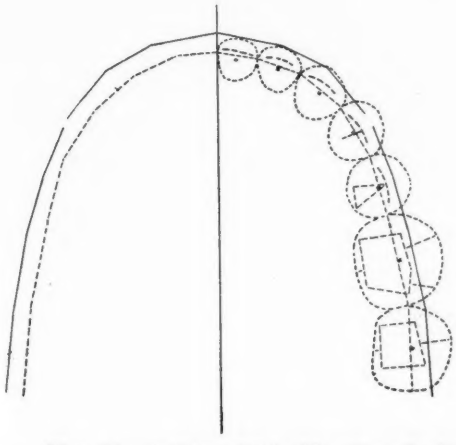


Fig. 35.—Lower right side of occlusion map complete. (Note smoothness of curves and correct inclination of the mandibular teeth.

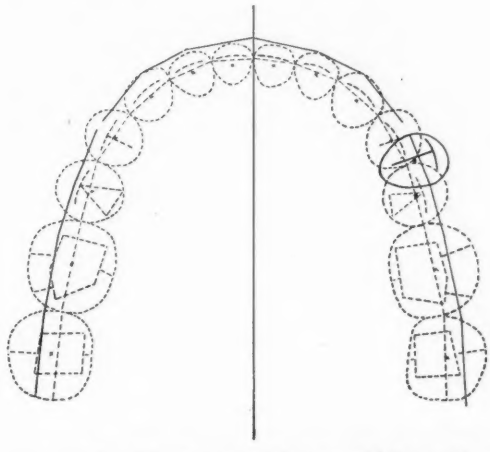


Fig. 36.—Lower map complete. Maxillary right premolar fitted into normal occlusion.

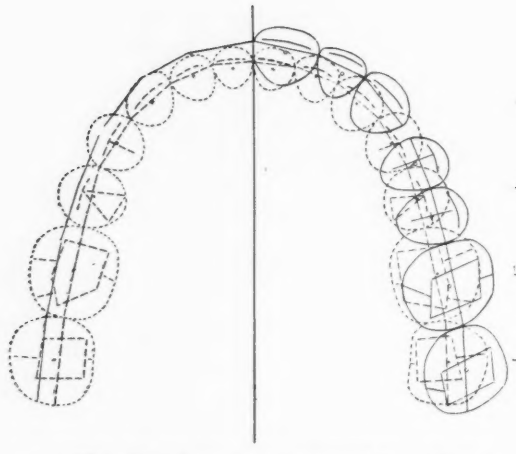


Fig. 37.—Lower map complete. Upper right map complete.

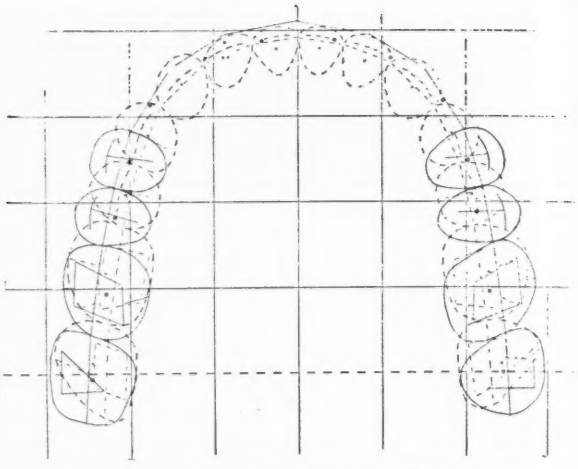


Fig. 38.—Lower map complete. Upper right and left complete.

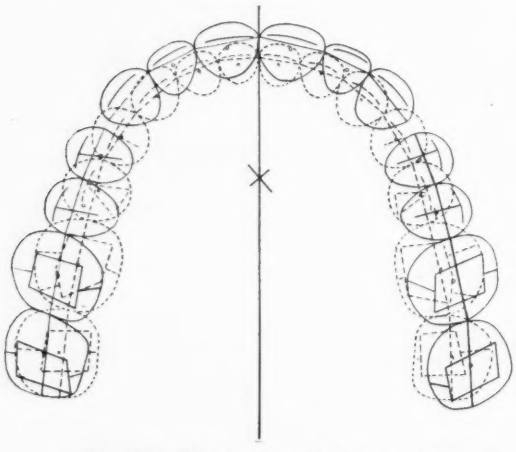


Fig. 39.—Map of occlusion. Axis of symmetry. Centroid of denture (Centroid of occlusion is calculated the same as for malocclusion.)

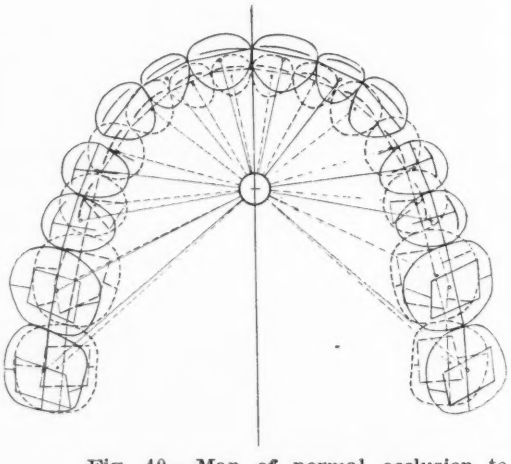


Fig. 40.—Map of normal occlusion to which vectors have been added. (In normal occlusion the vectors are of equal length and equal angle for paired teeth.

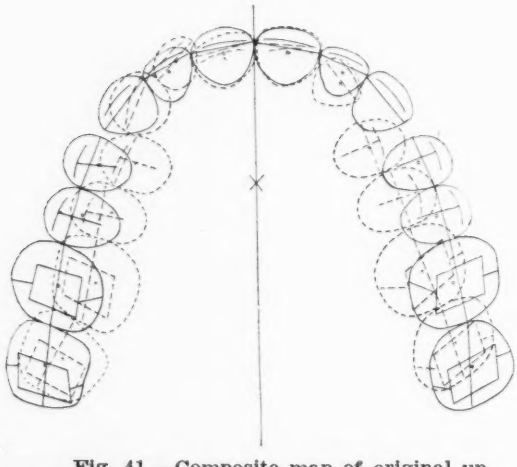


Fig. 41.—Composite map of original upper and upper map of occlusion related so as the squares of the movement shall be a minimum.

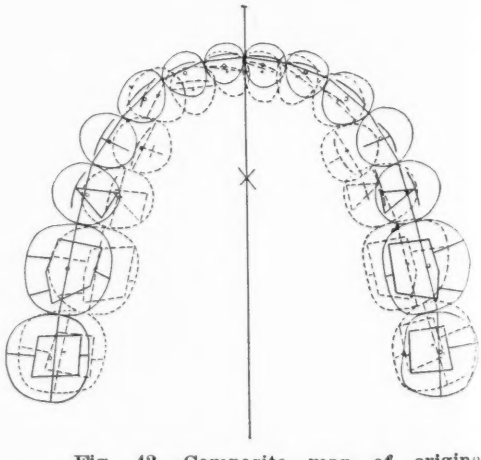


Fig. 42.—Composite map of original mandibular and occlusion map of mandibular.

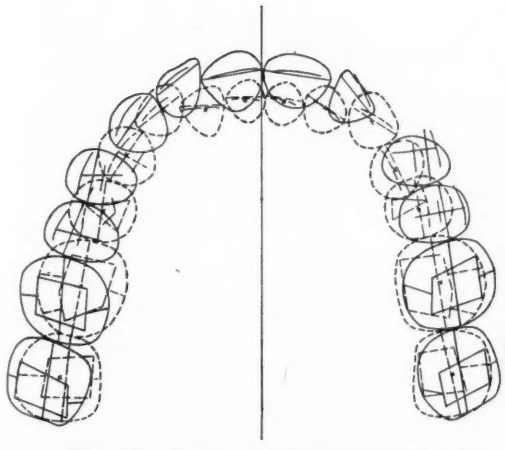


Fig. 43.—Upper and lower map showing result of the first stage of treatment. (Survey of the middle models in Figs. 1-5.)

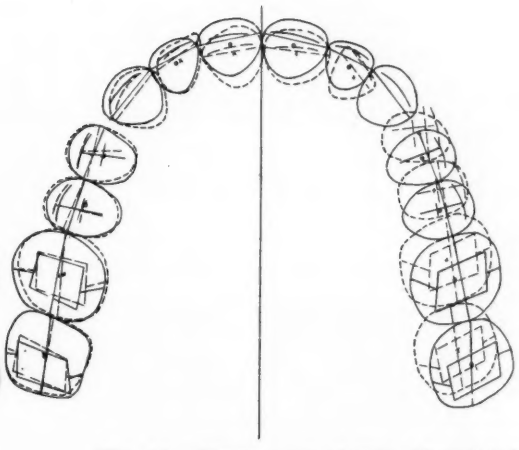


Fig. 44.—Upper map of Fig. 43, related to upper map of occlusion, showing an expansion of twelve mm. in first premolar region.

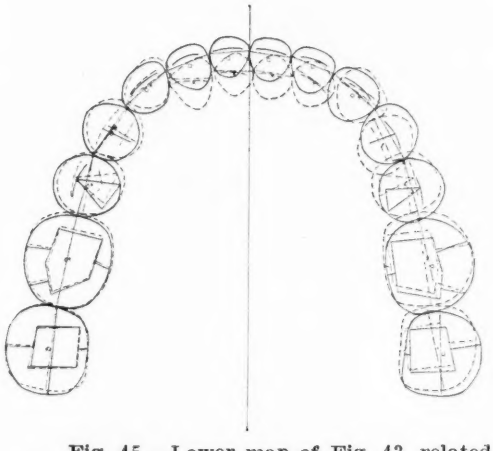


Fig. 45.—Lower map of Fig. 43, related to lower map of occlusion.

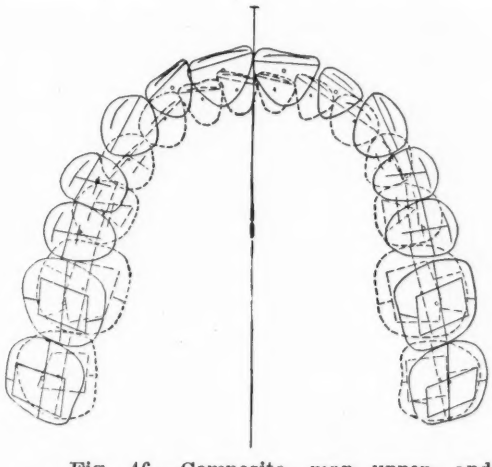


Fig. 46.—Composite map upper and lower survey of models at bottom of Figs. 1-5.

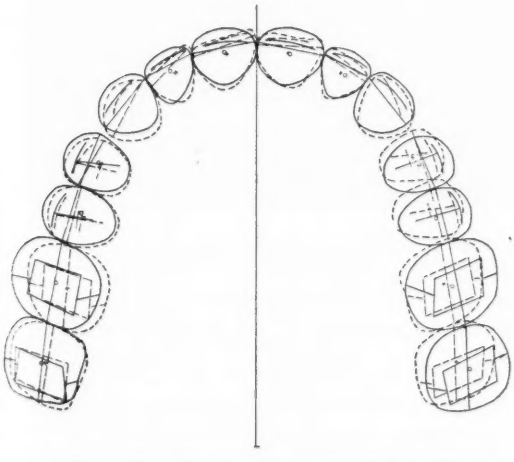


Fig. 47.—Composite map of maxillary (shown in Fig. 46) related to maxillary occlusion map.

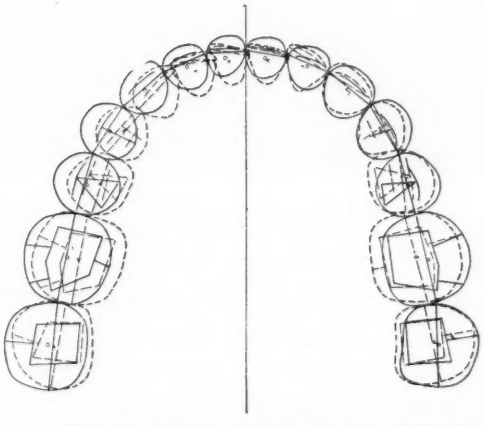


Fig. 48.—Composite map of mandibular (shown in Fig. 46), related to mandibular occlusion map. Note.—All map relations are made by registering centroids of dentures and axis of symmetry.

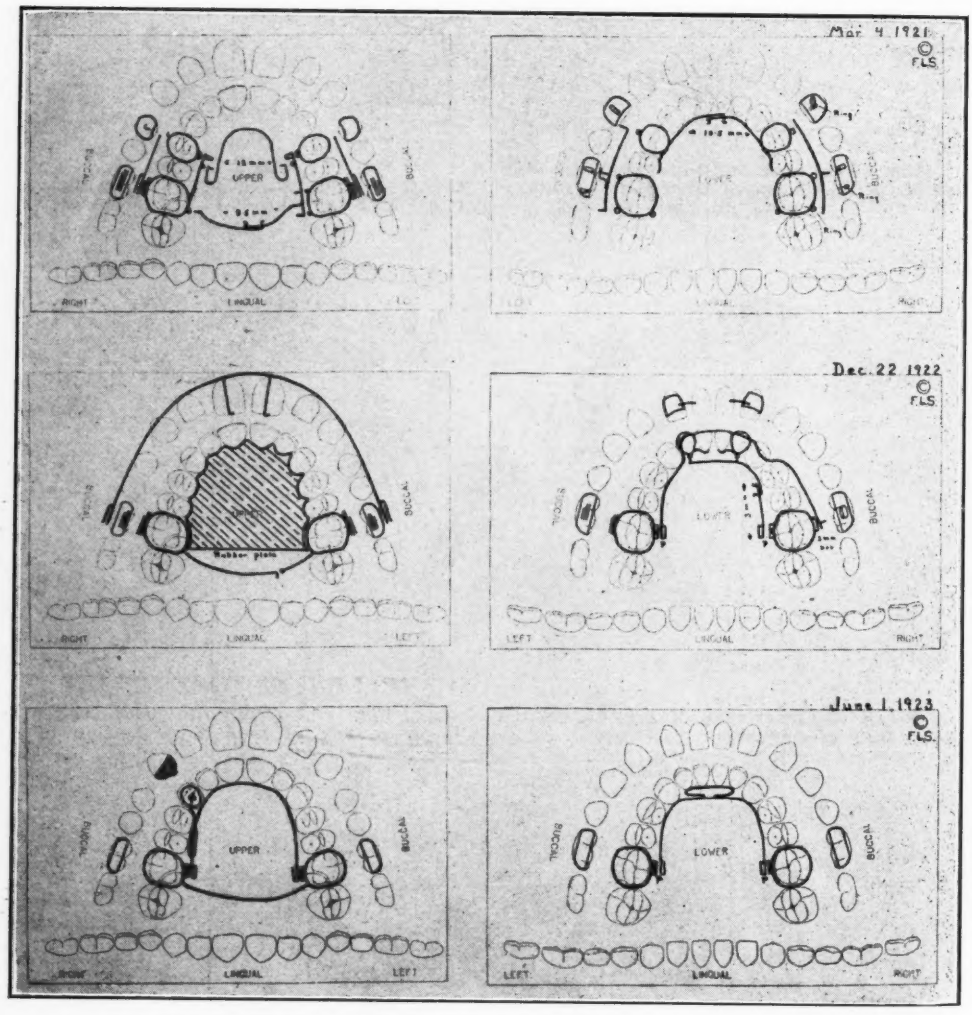


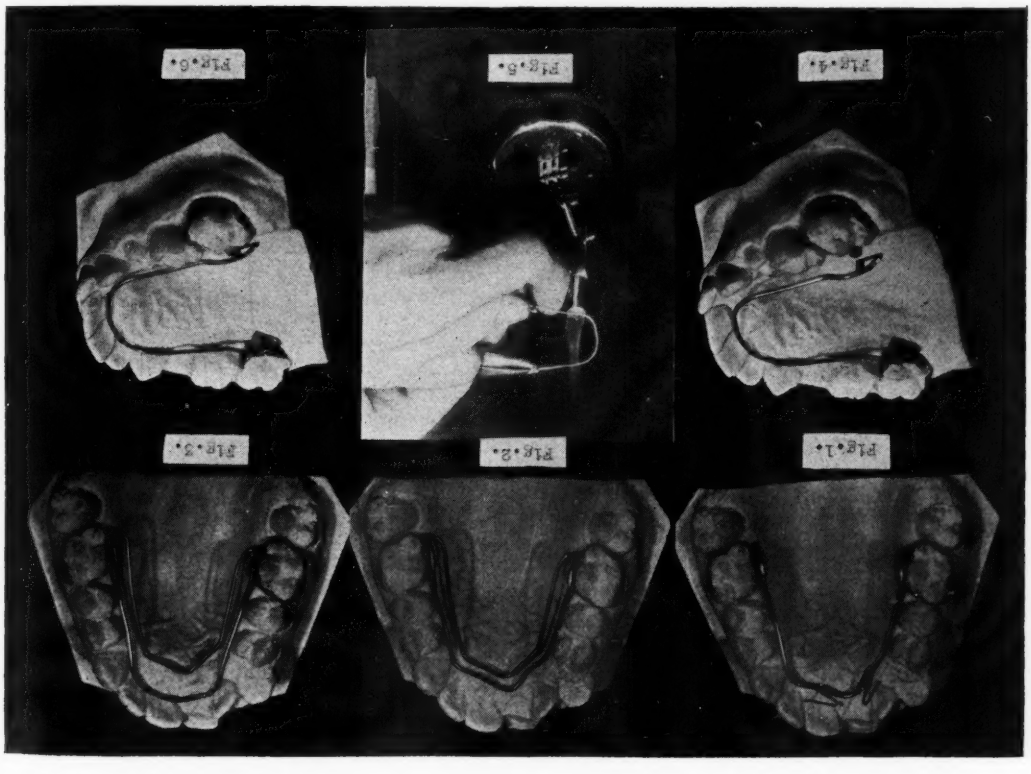
Fig. 49.—Appliance design sheets with drawings of appliances used.

ALTERATION OF APPARATUS DURING TREATMENT*

By Louis S. Winston, B.A., D.D.S., Houston, Texas

MODELS are used herein for convenience of illustration, but in both parts of this clinic it is to be assumed that the patient's mouth is being used, with bands in place on the anchor teeth.

I. After the auxiliary springs have produced such an amount of tooth movement away from the lingual arch (Fig. 1) that it is desired to readapt the arch, the following method may be used: Bend a piece of wire (scrap may be used) to the approximate shape of the body wire, only a little smaller.



Solder its ends to the distal extremities of the body wire, taking care, after the first end is soldered, to see that the second end lies passively in contact with extremity of body wire before soldering (Fig. 2). The auxiliary springs are removed, the body wire cut in its incisal region, and, with a few trials in the mouth, the free ends are bent to the positions in which it is desired that they touch the teeth. A splice of new wire is then soldered across the gap, giving the readapted arch. The extremities of the arch are then held in the flame and freed of the extra wire.

*Clinic given before the First International Orthodontic Congress, New York City, August 16-20, 1926.

This is a substitute for the longer technic of taking impression, removing molar bands, pouring up work model on which to remake the arch, and then recementing the bands. I use it only occasionally, when it is desired to economize time, and when I am certain that the molar bands have been recently cemented and are safe.

II. When molar bands are cemented on, in my experience, regardless of their accuracy of fit or the care with which they are pushed to place, they usually go on in a slightly different position than they occupied when the impression was taken and they were removed. This results in a misfit of the lingual appliance. If the mesial portion of the band has been forced a little too far gingivally, the result will be pressure by the body wire on the incisors; if the distal of the band has been pushed on a little too far, the result is that the body wire will stand off from the incisors. Likewise, if the lingual of the band goes on too far, the half-round wire on the opposite end of the arch will lie palatal to its tube when only the one half-round wire is inserted; while, if the buccal of the band goes on a little too far, when the half-round wire is placed in the tube the half-round wire of the opposite side will lie occlusal to its tube (Fig. 4).

The first two difficulties, namely, the arch pressing on the incisors or standing away from them, are obviously to be corrected by making the necessary amount of bend, either occlusally or gingivally, immediately anterior to the half-round wire.

The correction of the third and fourth difficulties, namely, when the opposite half-round wire lies palatal or occlusal to its half-round tube, is illustrated in this clinic. We desire a tortional bend or twist, but to do that with the arch cold will frequently break off the half-round wire. We therefore select the point on the arch where the twist should be made, and, holding that point in the flame, twist by means of pliers grasping the nearest half-round wire, the farthest end of the arch being held in the fingers (Fig. 5). The point selected will usually be in the premolar region. Then try in the mouth, and repeat if necessary until the arch stands as in Fig. 6.

A CLASS II CASE SHOWING PHOTOGRAPHS AND MODELS BEFORE AND AFTER TREATMENT (CLINIC)*

By Dr. William A. Hillis, Greenwich, Conn.

THIS case shows the development physically and mentally which can be hoped for in correction of a Class II case.

The child was a bad mouth-breather, had poor occlusion, was backward

in school, and showed no interest; all of this was overcome upon correction of his mouth condition.

Treatment of the case started January, 1922. Active treatment to January, 1924 (two years). Retention to January, 1926.

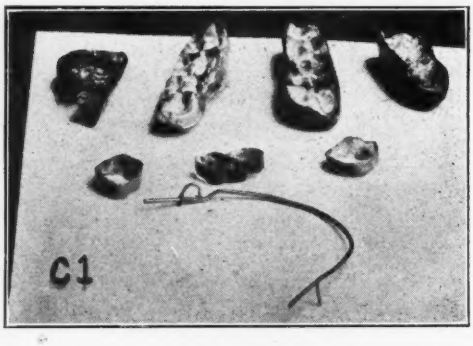
*Clinic given before the First International Orthodontic Congress, New York, August 16-20, 1926.

Case Reports

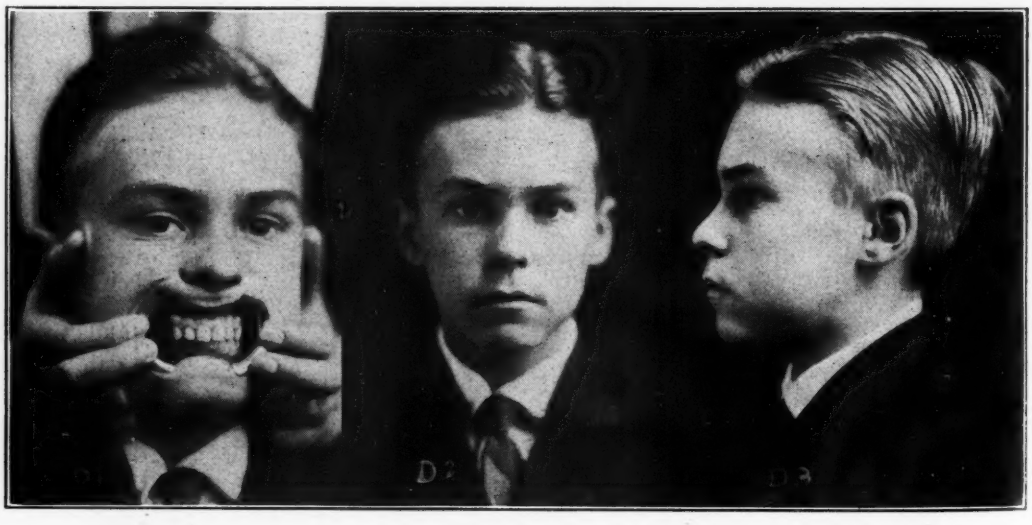
THREE CASES—NEUTROCLUSION, DISTOCLUSION, AND MESIOCLUSION (CASE REPORTS)*

By Dr. R. B. Van Gieson, and Dr. J. B. Stevens, Newark, N. J.

CASE 1.—Neutroclusion. The perpendicular center line of the mental eminence was considerably to the right. Both premolars and molars of right lower in lingual occlusion with lingual cusps of uppers impinging on buccal



Case 1.

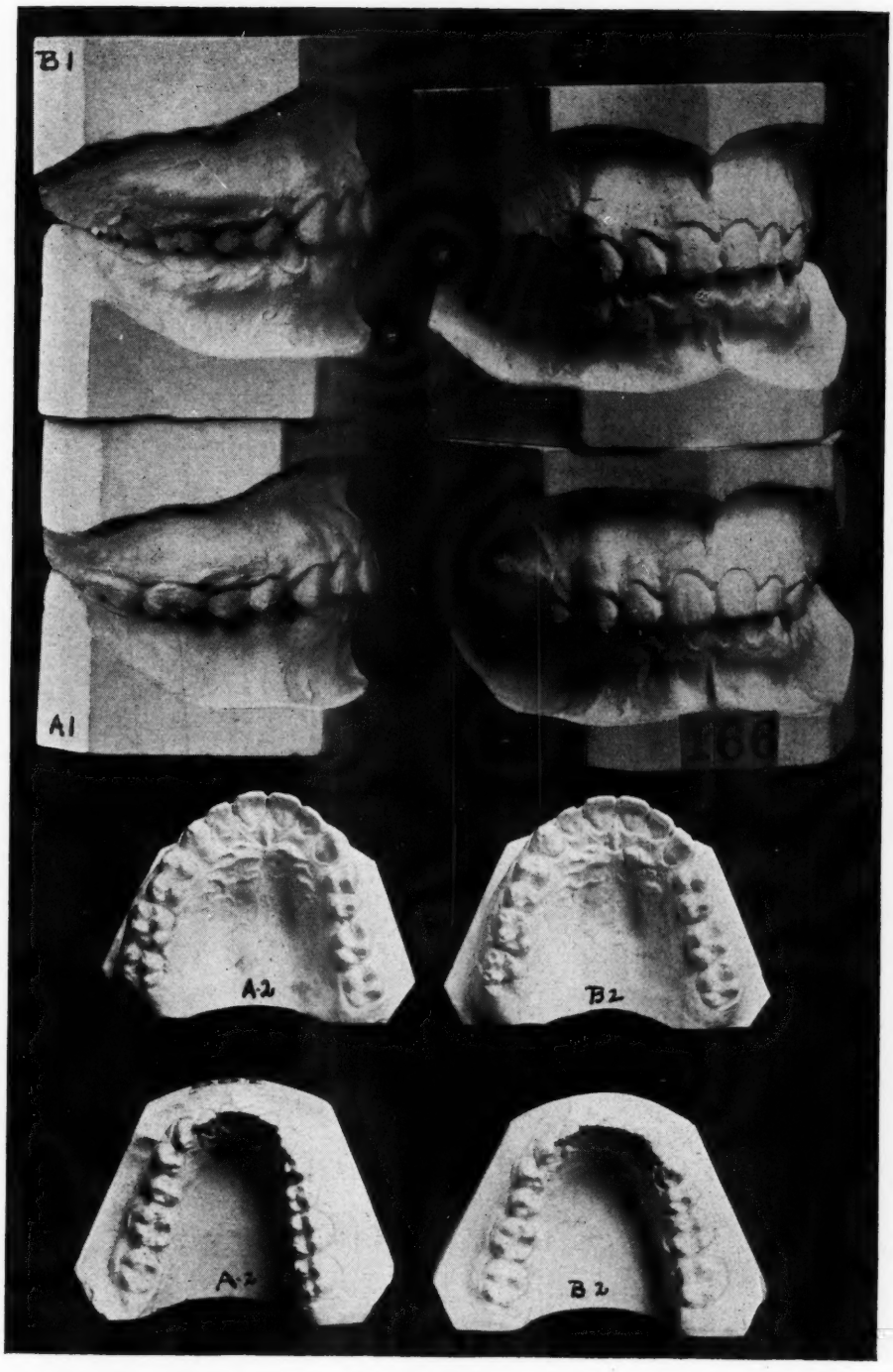


Case 1.

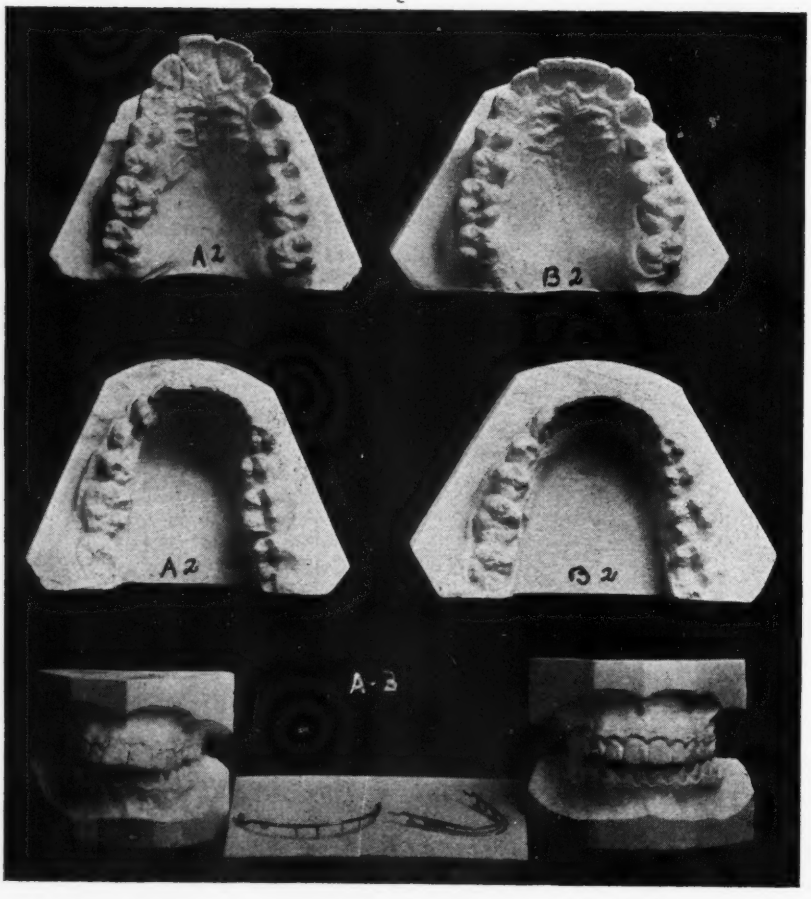
gum tissue of lower, and buccal cusps of lowers impinging on lingual gum tissue of upper. Male. February 1, 1924, twelve years of age.

Date of consultation, June 7, 1924. Date of study models, June 14, 1924. Date of plaster models, June 24, 1924. See photo A-1, A-2. Breathing, normal. Tonsils, normal. No adenoids. No bad habits. Physical condition, fair.

*Given before the First International Orthodontic Congress, New York City, August 16-20, 1926.

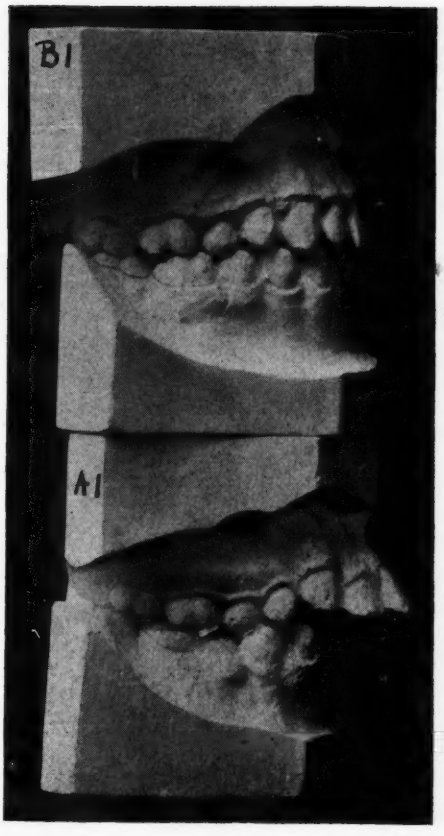


Case 1.



Case 2.

Case 2.



Case 2.

Case 2.

Treatment.—Began September 13, 1924. Splint on left to open bite. Labial arches on upper and lower. Set to contract and expand respectively. See photo C-1 for splints, and type of labial arch used. Thirty-seven visits. Completed case, January 15, 1926. See photo of models, B-1, B-2, taken five months after treatment.

Remarks.—Photograph taken before treatment lost. See photograph D-1, D-2, D-3, after treatment.

Case 3.

Case 2.—Distoclusion. Female. Thirteen years of age.

Date of consultation, September 8, 1924. Date of study models, September 8, 1924. Date of plaster impressions, October 22, 1924. See photo of models A-1, A-2. Tonsils and adenoids removed, 1918. Breathing, mouth-breather. Habits, used pacifier and sucked thumb. Physical condition, fair. Underweight and undernourished.

Treatment.—Began December 12, 1924. Expansion obtained with upper and lower lingual arches with auxiliary springs. May 9, 1925, high labial upper arch, with finger springs on incisors. Intermaxillary hooks at canine

region, and intermaxillary elastics. See photo of appliances A-3. Twenty-nine visits. Case completed (retainers inserted) January 15, 1926. See photo B-1, B-2, of models taken June 15, 1926. See photo C-1, C-2, before treatment. See photo D-1, D-2, after treatment.

CASE 3.—Mesioclusion. Male. June 19, 1924. Twelve years of age. Date of consultation, August 12, 1924. Date of study models, August 14, 1924. Date of plaster impressions, November 10, 1924. See photo A-1, A-2,

Case 3.

Case 3.

of models. Breathing, normal. Enlarged thyroid. Under observation of physician. Robust build. Marked mental activity.

Treatment.—December 3, 1924, inserted upper appliance. Upper:—Molar bands with curved sheaths. Bracket bands on first premolars and incisors with ribbon arch. December 9, 1924, inserted lower appliance. Lower:—Bands with round tubes on first molars. Plain bands with lugs on cuspids. Plain labial arch (0.036) with intermaxillary hooks at cuspid region. Inter-

maxillary elastics used six months. Normal mesiodistal relationship established in six months. July 21, 1925, all appliances removed. Lower lingual inserted, with auxiliary springs, and ligatures, with bands on premolars for rotation. Active treatment completed December 15, 1925. June 15, 1926, impressions taken for models, shown in B-1, B-2. See photographs C-1, C-2, taken before treatment. See photographs D-1, D-2, taken after treatment, and D-3.

Remarks.—We received excellent cooperation in the treatment up to December 15, 1925. After this, he became very indifferent and obstruent, giving us infinite trouble with resultant abandonment of treatment.

CASE REPORT*

By Adelbert Fernald, B.S., D.M.D., Boston, Mass.

Instructor in Orthodontia, Curator of the Museum, and Librarian, Dental Department of Harvard University.

(1) Mutilated Cases of Class III. (2) Illustrating a Case Where the Canine Erupted Against Central, and Lateral Against First Premolar

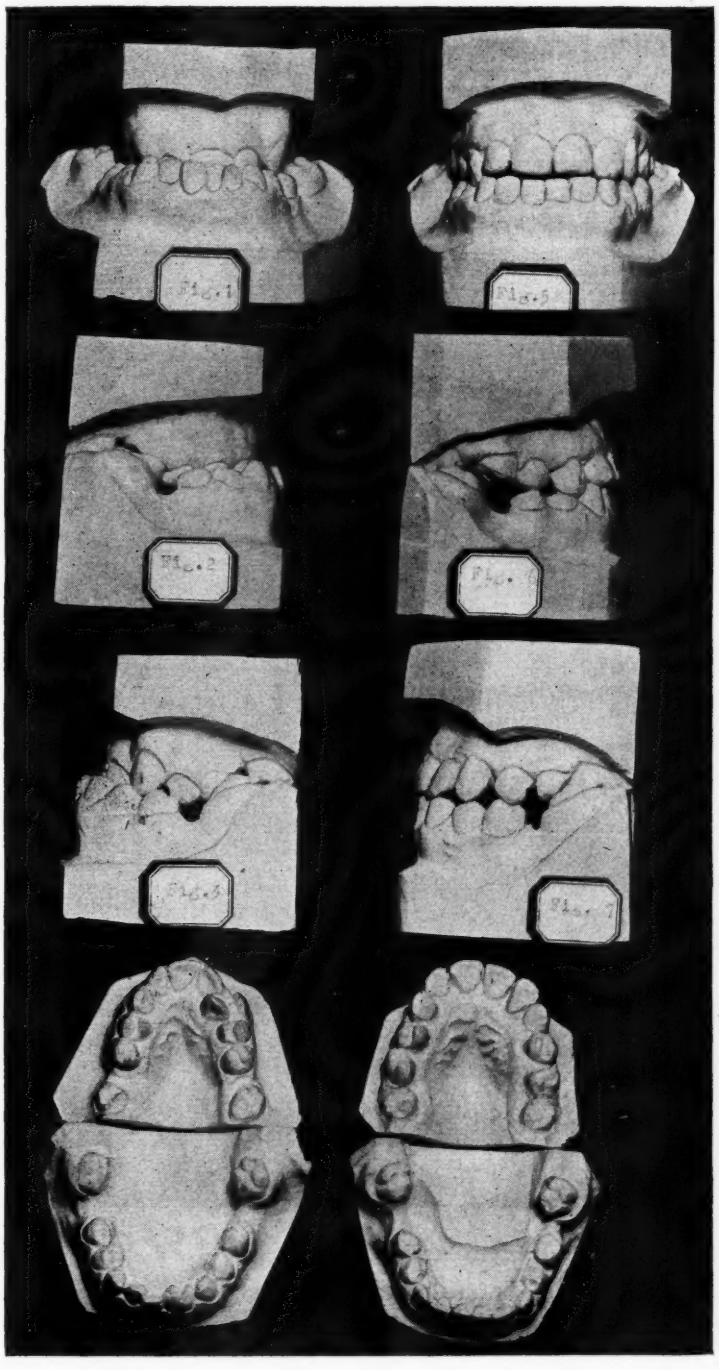
Figs. 1, 2, 3, 4, Case 1. A boy twenty-two years old, mutilated case of Class III, with all four six-year molars and all four twelve-year molars removed, maxillary left lateral in lingual occlusion. The occlusion of this case was such that the boy had the appearance of an aged person without any teeth, or his face looked as though his chin and nose would meet. The line between the two centrals was nearly one-quarter of an inch to the left as the lateral was in lingual occlusion and there was no space for it. The case has so many unusual features I am reporting it now although it is not quite finished. The occlusion is becoming quite efficient and is as nearly normal as could be expected of a case of this type. At present occlusion is being held open by superior right canine. Figs. 5, 6, 7, 8. Appliances adjusted October, 1924.

Figs. 9, 10, 11, 12. Case 2. A young lady sixteen years old with lateral erupting against maxillary right first premolar and canine erupting in contact with maxillary right central. The canine was pushed lingually and distally. The lateral was pushed labially and mesially until (see Fig. 12) lateral is nearly in normal position alongside central and canine is in normal position touching the first premolar. In this case I have used both lingual and labial appliances and at present am using the pin and tube which will complete the case as I shall allow this appliance to remain in position for a long time. Teeth and tissue are alive and healthy. Appliances adjusted January, 1922.

Fig. 13. A man about twenty-eight years old, six feet four inches, with an extreme mutilated case of Class III. He had two superior right and left

*Case report given before the Twenty-sixth Annual Meeting of the American Society of Orthodontists held at New York City, August 19-23, 1926.

canine teeth and one premolar and two molars. In the mandible there were six teeth remaining, including the right and left canine, two third molars all more or less carious. He had so few teeth and the deformity was so great



Figs. 1-8.

considering his age that I decided to remove all of his teeth as they were useless, and make full upper and lower dentures. This was done, the two maxillary canine teeth are now in the Harvard Dental Museum and are one

and one-quarter inches in length. The mandibular teeth of dentures were set back inside the arch and the maxillary teeth brought forward nearly three-quarters of an inch, bringing the occlusion end to end.

This work was done about thirty-one years ago, in 1895; the teeth for these dentures were carved by the late Dr. Aaron Parker who personally carved every tooth that he used. In 1915 I wrote to this patient and told him that if he would give me his old plates I would pay him the price for

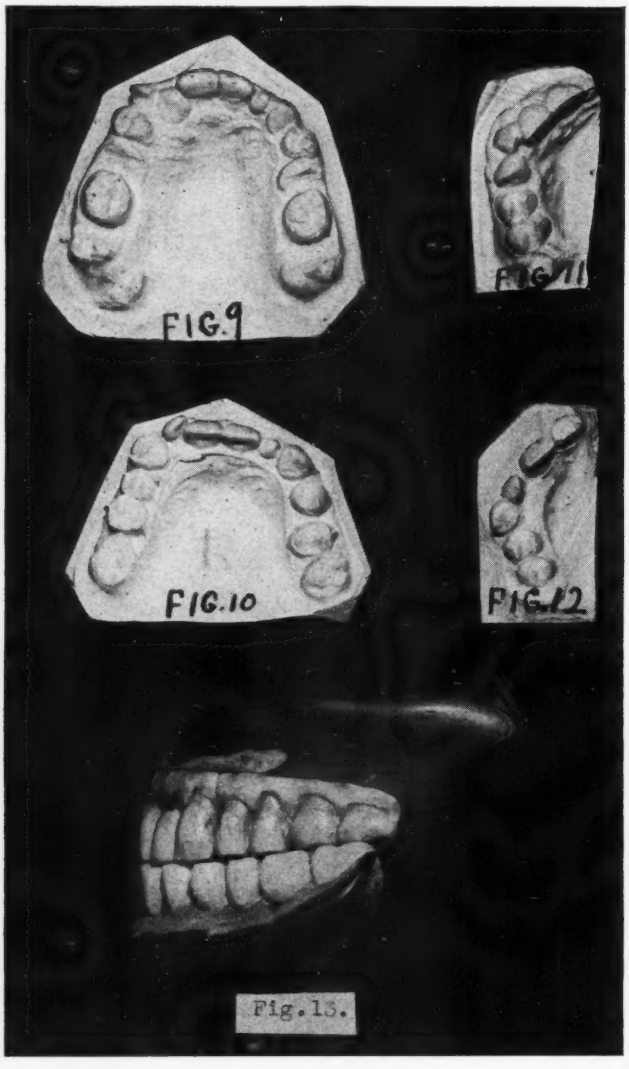


Fig. 13.

two new ones. He wrote me a letter, which I now have, saying that he might part with his wife or children, but never with his teeth. Last week I received a registered parcel signed by his wife. On opening it I discovered the two dentures I made so long ago. The patient passed away suddenly with heart disease, but had requested his wife to return the teeth to me. You may think that any man wearing teeth like these for thirty-one years would naturally have died of heart disease, but personally I think they have been the means of keeping him alive so long. (See Fig. 13.)

DEPARTMENT OF

ORAL SURGERY, ORAL PATHOLOGY AND SURGICAL ORTHODONTIA

Under Editorial Supervision of

M. N. Federspiel, D.D.S., M.D., F.A.C.S., Milwaukee.—Vilray P. Blair, M.D., F.A.C.S., St. Louis, Mo.—Theodor Blum, D.D.S., M.D., F.A.C.D., NewYork.—Leroy M. S. Miner, M.D., D.M.D., Boston.—Wm. L. Shearer, M.D., D.D.S., Omaha.—Fredrick F. Molt, D.D.S., Chicago.—Robert H. Ivy, M.D., D.D.S., Philadelphia.—Edward L. Miloslavich, M.D., Milwaukee.—Sterling V. Mead, D.D.S., Washington, D. C.

DENIGN GIANT-CELLED TUMOR

By Sterling V. Mead, D.D.S., Washington, D. C.

THE drawing shown in Fig. 1 and photograph, Fig. 2, show a pedunculated growth in the floor of the mouth, in the right cuspid and bicuspid region. The patient was a medical student, twenty-eight years of age. He said the tumor had been growing slowly for about six months since he first

Fig. 1.

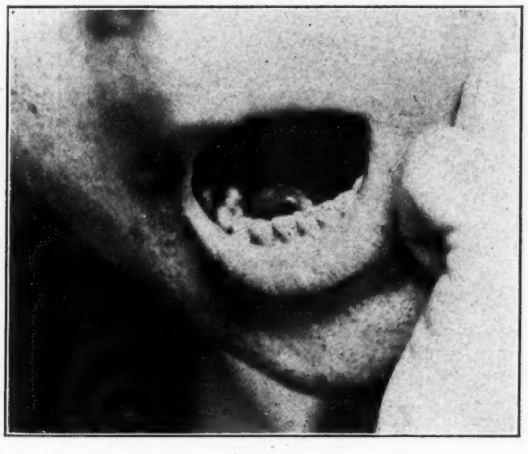


Fig. 2.

noticed it, and that there was no pain, other than the discomfort from the displacement of the tongue. The growth was fully encapsulated, soft, and its pedicled attachment allowed free movement of the tumor. The color resembled the surrounding mucous membrane, and the covering was entirely smooth. There was a slight open contact space between the cuspid and bicuspid teeth.

The growth was removed under novocaine anesthesia by cutting at its attachment in the floor of the mouth near the apices of the cuspid and bi-

cuspid teeth, and it was removed down to and including the periosteum, but the teeth were not disturbed. It did not involve the teeth, as is often the case with growths of this nature.

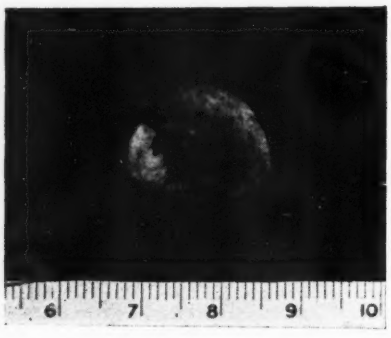


Fig. 3.

Fig. 4.

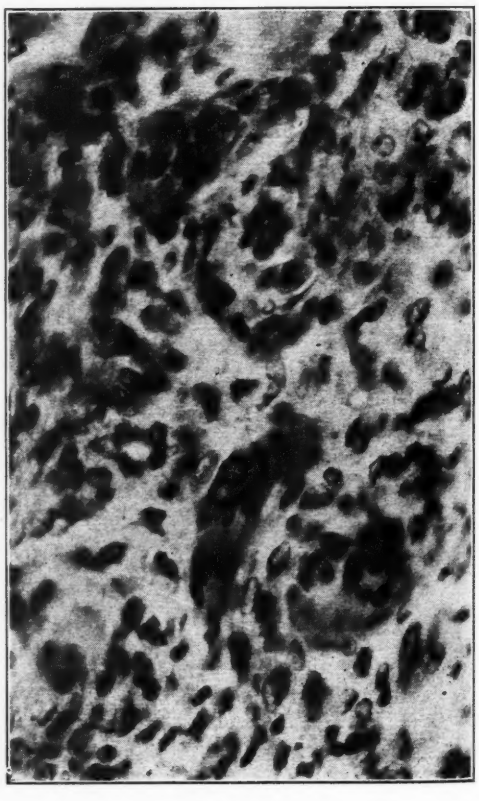


Fig. 5.

Gross Description.—The growth consisted of an oval mass about 1¼ cm. in diameter, with smooth outer surface. On sectioning it was found to be a soft connective-tissue growth, surrounded by a sort of fibrous capsule covered with epithelium. (Fig. 3.)

Histologic Description.—Underneath the epithelial covering is seen the connective tissue, the fibers generally running parallel, and forming a sort of loose capsule where the fibers are abundant. Hemorrhagic areas are present.

The central area shows predominance of spindle-cellular tissue containing many multinucleated giant-cells. Fig. 4 is a photomicrograph of tissue as seen under low power, and Fig. 5 is a photomicrograph of tissue as seen under high power, showing the cellular constituents.

Diagnosis.—The tumor is typical, circumscribed, and encapsulated; its growth is slow, and it is attached to the surrounding tissue by a pedicle. Section shows the large number of characteristic giant-cells, and it is therefore apparent that it is a benign giant-celled tumor. This tumor is often spoken of as epulis, giant-celled sarcoma, myeloma, etc. Differential diagnosis would be among, papilloma, fibroma and sarcoma.

ABSTRACT OF CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Alveolar Pyorrhea; Necrosis of Bone; Iodoform Tamponade; Nephritis. Zacharias (Waren). Zahnaerztliche Rundschau, May 8, 1927, xxxvi, 19.

This very unusual sequence occurred in a physician aged twenty-six, who first presented pyorrhea in 1920 which disappeared under local applications but relapsed in 1925. In January, 1926, his four mandibular incisors required extraction. Pyorrhea elsewhere received local applications. In March the mandibular canines were treated with arsenic and the pulps were later removed. Severe toothache followed and persisted but neither granulomata nor pus was found. After transitory improvement the pains returned with fetor, the canines loosened and were extracted. Foul pus escaped, the wounds failed to heal, there was bad taste in the mouth and a diagnosis was made of necrosis although the roentgen diagnosis was negative. Dead-bone was brought away by the sharp curette. A diagnosis had to be made between simple necrosis from external infection and osteomyelitis but the latter could be excluded by absence of fever and acute swelling. As a radical intervention was indicated all of the infected alveoli were exposed and a gangrenous sequester was brought away intact while neighboring infected bone was curetted. The wound was left open save for an iodoform gauze tamponade. Although the wound was healing well, alarming general symptoms revealed the presence of a nephritis thought to be due to the absorption of iodoform. As soon as the gauze was discontinued this complication improved and the patient was soon restored to health. Careful study of the case pointed to the fact that a slight fracture of the mandible had resulted from the extraction of the incisors while some of the infecting organisms gained access to the interior of the bone already diseased somewhat by pyorrhea.

Convulsive Tic. C. N. Russell (Philadelphia). The Dental Cosmos, May, 1927, lxix, 5.

This troublesome affection is supposed to belong to the province of the neurologist but from its occasional association with tooth troubles the patients now and then come directly to the dentist, who must be prepared to deal with them. Thus the author has seen personally three such cases of which the first occurred in a woman of forty whose face had twitched for many years. After

removal of a pulpless maxillary left second premolar with a rarefaction about the apex, the local spasm has been so reduced that the author looks forward tc the removal of some crowns on the incisors and amputation of some roots. In the second case, a woman of thirty-five, there was at first a typical Bell's palsy of the left side attributed to carious teeth, several of which were at once extracted. Later it was found that while asleep the patient had been exposed to a marked cold draft which sufficiently explained the palsy. The condition slowly subsided of itself and on recovery the originally paralyzed facial nerve began to twitch although this condition too subsided spontaneously in two months. Here it was probable that the affection was not of dental origin. The third patient was a man of forty-one who developed a facial spasm during convalescence from influenza with nephritis as a complication. The case was so severe that the man became a social outcast. Every remedy was tested, including the extraction of several teeth, but as no permanent improvements resulted alcohol, 70 per cent, was injected directly into the offending muscles. After a prolonged course of these injections the spasms were finally overcome. Pain was slight and no deformity remained behind.

Calculus of Wharton's Duct. Thésée (Brest). La Revue de Stomatologie, May, 1927, xxix, 5.

The author reports the following case by reason of the fact that several others of the same character have recently been placed on record. The patient was a man of fifty-two who complained of painful swallowing, and a lump in the floor of the mouth to the left, with slight swelling of the mandibular region. On opening the mouth some pus escaped in the region of the frenum of the tongue. The patient's teeth were in good condition, although but five remained in the left half of the mandible. A diagnosis was made of calculus of Wharton's duct to the left, although the radiogram was of little value. As the trouble was of long standing it was thought best to extirpate the submaxillary gland of the affected side, in which the stone was thought to exist. This was done from without, but section revealed no calculus and the enlarged and indurated gland suggested the possibility of malignant degeneration. Fortunately the stone came away later in the discharges of the operation wound and was of the size of the crown of a small incisor tooth. The mass had evidently occupied the duct peripherally to the gland, so that the original diagnosis had been in the main correct. As to the wisdom of removing the gland under the circumstances, this has been sanctioned in chronic inflammation and also in recurrent lithiasis to prevent recurrence, the cervical route being preferable to the intrabuccal.

Wandering Rash of the Tongue. H. Prinz (Philadelphia). The Dental Cosmos, March, 1927, lxix, 3.

Under the above title the author describes what is more commonly known as geographic tongue. He has seen about a dozen cases in approximately that number of years in the Evans Institute alone, this number including cases seen in the students. The affection has been known for nearly a hundred

years and has received numerous designations in addition to the two just mentioned. Practically nothing is known of the etiology and it has been found in association with many constitutional conditions which probably have no direct connection with it. It has sometimes attacked several children in the same family but is certainly not contagious. It begins in pea-sized spots on the dorsum of the tongue which spread at the margin, often encountering other denuded areas with the formation of polycyclic outlines. Migration is characteristic of the disease, which is never stationary until a certain arrest takes place. The areas may disappear completely or may once more begin to extend at the border. The final selection of the term "wandering rash" signifies that this expression describes the malady better than any other. Diagnosis is usually easily made, especially after a short observation period. Treatment is highly unsatisfactory but as the affection is entirely harmless and causes little trouble, the patient remains more or less indifferent to it and often does not think of medical aid. It is, of course, necessary to do something and roentgenotherapy may be tested with any mild alkaline lotion. If the tongue gets unpleasantly raw anesthesin or novocaine may be employed. As far as known these patients have never developed cancer of the tongue.

The International Journal of Orthodontia, Oral Surgery and Radiography

PUBLISHED THE FIFTEENTH OF EVERY MONTH BY

THE C. V. MOSBY CO., 3523-25 Pine Blvd., St. Louis, Mo.

Foreign Depots — *Great Britain* — Henry Kimpton, 263 High Holborn, London, W. C.; *Australasia*—Stirling & Co., 317 Collins Street, Modern Chambers, Melbourne; *India*—"Practical Medicine," Egerton Street, Delhi; *Porto Rico*—Pedro C. Timothee, Rafael Cordero 68, San Juan, P. R.

Subscription Rates—Single copies, 75 cents. To anywhere in United States, Cuba, Porto Rico, Canal Zone, Mexico, Hawaii and Philippine Islands, $7.00 per year in advance. Under foreign postage, $7.40. Volume begins with January and ends with December of each year.

Remittances—Remittances for subscriptions should be made by check, draft, postoffice or express money order, or registered letter payable to the publishers, The C. V. Mosby Company.

Contributions—The editor will be pleased to consider the publication of original communications of merit on orthodontic and allied subjects, which must be contributed solely to this Journal.

Opinions—Neither the editor nor the publisher hold themselves responsible for the opinions of contributors, nor are they responsible for other than editorial statements.

Reprints—The publishers will communicate with authors regarding reprints upon publication of paper.

Communications—Contributed articles, illustrations, letters, books for review, and all other matter pertaining to the editorial department should be addressed to the Editor, Doctor Martin Dewey, 17 Park Ave., New York City. All communications in regard to advertising, subscriptions, change of address, etc., should be addressed to the publishers, The C. V. Mosby Company, 3523-25 Pine Blvd., St. Louis, Mo.

Illustrations—Such halftones and zinc etchings as in the judgment of the editor are necessary to illustrate articles will be furnished when photographs or drawings are supplied by the authors of said articles.

Advertisements — Objectionable advertisements will not be accepted for publication in this Journal. Forms close first of month preceding date of issue. Advertising rates and sizes on application.

Change of Address—The publishers should be advised of change of subscriber's address about fifteen days before date of issue with both new and old addresses given.

Nonreceipt of Copies—Complaints for nonreceipt of copies or requests for extra numbers must be received on or before the fifteenth of the month of publication; otherwise the supply is apt to be exhausted.

Entered at the Post Office at St. Louis, Mo., as Second-Class Matter.

EDITORIALS

The Need of Orthodontia

DR. JOSEPH D. EBY in his address before the American Society of Orthodontists in May, called attention to the matter of research as related to orthodontia. For a number of years it has been apparent that problems were arising in the correction of malocclusion which could only be satisfactorily solved by making investigations along correlated lines. There are various problems in anatomy and histology regarding the teeth and supporting structures which have a direct bearing upon orthodontia and require careful investigation.

Research in other branches of dentistry and medicine, has thrown light on certain problems as related to malocclusion. The work of Howe, Marshall, and McCollum on the diet of animals has had a great bearing upon the etiology of malocclusion. However, investigations along histologic lines have

not yielded such desired information from the orthodontic standpoint. This is probably due to the fact that most histologic investigators during the last few years have been concerned more with the study of dental tissue than with supporting structures of the teeth; especially, the alveolar process, peridental membrane, and cementum, as found in the apical region and alveolar portion of the teeth.

A number of orthodontists have carried on independent researches on certain problems. Hellman has made extensive studies at the American Museum of Natural History, which have revealed many interesting anatomic facts. A. LeRoy Johnson and his associates at the University of Pennsylvania have carried on different investigations. Mershon has sponsored scientific investigations that will be of great benefit to humanity. Neustadt has made studies of the alveolar process and associate tissues, which have a great bearing on treatment. However, the task is so large that no one man can be expected to carry it to a satisfactory completion. The work will extend over a number of years and the expense involved will be considerable. It was with this idea in view that Dr. Eby recommended that the American Society of Orthodontists endorse research and make some effort to support it.

A number of men in the American Society of Orthodontists believe that more good could be accomplished by working along research lines that are already organized. For a number of years, the American Dental Association has maintained a research commission the duty of which is to investigate, advise, and assist in such research problems as will be of benefit to dentistry. With that object in view the following resolution was adopted and passed at the Chicago Meeting of the American Society.

WHEREAS, the President has recommended that the American Society of Orthodontists shall use their influence in promoting certain research problems, and

WHEREAS, the problems of research are expensive and difficult, and

WHEREAS, the American Dental Association maintains a research commission, and

WHEREAS, a large percentage of the members of the American Society of Orthodontists are members of the American Dental Association and are therefore contributing to the research fund of the American Dental Association; be it therefore

Resolved, that the President of the American Society of Orthodontists, subject to the approval of the Executive Committee, appoint a committee of five, one to serve one year, two years, three years, four years and five years respectively, and one to be appointed annually thereafter to serve five years, said committee to suggest to the Research Commission of the American Dental Association such problems of research as are of interest to the orthodontic profession, and be it further

Resolved, that all members of the American Society of Orthodontists who are members of the House of Delegates of the American Dental Association use their influence in having incorporated into the budget of the American Dental Association such funds as will be required to carry on such research work as is recommended by the American Society of Orthodontists, and be it further

Resolved, that the Committee of Research of the American Society of Orthodontists shall have reported to them all research that is being carried on by members of the American Society of Orthodontists for the purpose of record and progress and importance. Also progressive research shall be reported to the Research Commission for the purpose of recommendation as to aid and assistance for such research as seems to be of value to the orthodontic profession.

The Committee of Research shall present a budget of proposed expenditures for each year at the annual meeting, said proposed budget shall be approved by the Society at the annual meeting.

In accordance with the above resolution, President Walter Ellis has appointed a committee of five composed of the following men: Albert H. Ketcham, Milo Hellman, A. LeRoy Johnson, Lloyd S. Lourie, and Martin Dewey to serve five, four, three, two, and one year, respectively.

This committee has considered various plans that have been suggested by men who are interested in orthodontic research. They have prepared an outline of the plan to be presented before the Research Commission of the American Dental Association and have requested that at least six thousand dollars be set aside for orthodontic research for a number of years. This money, of course, will have to be spent in accordance with the rules and regulations governing such grants as are made by the Research Commission of the American Dental Association. In order that this plan may have proper consideration by members of the Research Commission, it is suggested that every member of the American Society of Orthodontists get in touch with the men from his state who will act as delegates in the House of Delegates in the American Dental Association at the October meeting in Detroit. The Research Committee of the American Society of Orthodontists also requests that every orthodontist who is personally acquainted with any member of the Research Commission of the American Dental Association, use his influence in furthering the cause of orthodontic research with the members of the Research Commission of the American Dental Association.

The Research Committee of the American Society of Orthodontists respectfully requests that all members of the American Society present this matter at the earliest possible opportunity. For the enlightenment of those men of the American Society who do not know the personnel of the Research Commission of the American Dental Association we publish herewith the list of members as they now stand.

Henry L. Banzhaf, Milwaukee, Wisconsin
Roscoe H. Volland, Iowa City, Iowa
Otto U. King, Chicago, Illinois
Frank O. Hetrick, Ottawa, Kansas
C. C. Allen, Kansas City, Missouri
H. J. Burkhart, Rochester, New York
L. E. Ford, Los Angeles, California
H. E. Friesell, Pittsburgh, Pennsylvania
J. M. Murphy, Temple, Texas
William A. Giffen, Detroit, Michigan
Harry E. Kelsey, Baltimore, Maryland
W. R. Wright, Jackson, Mississippi
Harold DeWitt Cross, Boston, Massachusetts
B. Frank Gray, San Francisco, California
William A. Grey, St. Paul, Minnesota
William Hopkinson, Milwaukee, Wisconsin
M. D. Huff, Atlanta, Georgia
L. L. Barber, Toledo, Ohio
E. H. Bruening, Omaha, Nebraska

John P. Buckley, Los Angeles, California
John V. Conzett, Dubuque, Iowa
Weston A. Price, Cleveland, Ohio
Homer C. Brown, Columbus, Ohio
G. A. Crise, Manhattan, Kansas
G. Walter Dittmar, Chicago, Illinois
George O. Orr, St. Paul, Minnesota

There can be no doubt but what all information gained as a result of orthodontic research will be of value to the dental profession. The study of malocclusion and its correction is one of the greatest problems with which the dental profession is confronted today. Malocclusions are on the increase and as a result of that, orthodontic research will tend to make the correction of those cases more speedy and efficient. Research will have a great benefit upon humanity. The Research Commission of the American Dental Association can do nothing better than spend some of the available funds in assisting the members of the American Society of Orthodontists in solving problems which are becoming more apparent year after year. The officers and the Research Committee of the American Society of Orthodontists request every member to do his utmost with the members of the House of Delegates of his state and with the various members of the Research Commission.

FORUM

Report of Round Table Discussion*

Table No. 2.—Topic: On account of the constantly increasing demand for orthodontic service should the general practitioner be encouraged to prepare himself to include orthodontic treatment in his practice?

Chairman—O. E. Busby, Dallas, Texas
Vice-Chairman—P. C. Spencer, Waco, Texas

Discussion was general by those present. This group was exceptionally fortunate in having two members present who are in general practice; Dr. C. W. Hoffer, Nashville, and Dr. L. P. Abbe, Hartford. Thereby getting the general practitioner's viewpoint.

The unanimous opinion was "no." For the following reasons: It is difficult to convince the general practitioner (and also lots of orthodontists) that orthodontics extend beyond the field of mechanics.

Proficiency in treatment is of value only to the extent of diagnosis.

The general practitioner is a rich field for laboratory appliances, instructions, and diagnosis for treatment attached, which results in more harm than good.

Because of the great need of orthodontia, is not sufficient reason to promote improper treatment, as so-called "simple cases" are usually the most difficult.

We should make a greater effort through our local and district Dental Societies to promote study by the general practitioner in diagnosis. Naturally, this will produce more orthodontists, as the practice of orthodontia and general dentistry is not compatible.

Through such education malocclusion will be earlier recognized. The majority of referred cases should have been under treatment at a much younger age.

A general practitioner who will not make sufficient effort to master a modern dental technic, willingly attempts the treatment of malocclusion with laboratory appliances.

The general practitioner will gain greater income through preventative orthodontia, than by extensive treatment.

Table No. 12.—Topic: If the practice of orthodontia is a true science, what is the most feasible plan to extend the service it has to offer to the masses in a competent manner?

Chairman—Hugh G. Tanzey, Kansas City, Mo.
Vice-Chairman—Wm. J. Brady, Kansas City, Mo.

*Report of Round Table Discussions held at the Twenty-sixth Annual Meeting of the American Society of Orthodontists, May, 1927.

After briefly discussing the above subject from various angles, for one and a half hours, it was unanimously agreed that the following report should be turned in:

The matter of proper extension of orthodontic service to the masses is vitally linked with the problem of the undergraduate. The proper stimulation of greater interests in this branch of dentistry is indispensable for the extension of such service.

All of the members of this group having had more or less experience as teachers in undergraduate schools, and several who have taught postgraduate classes throughout a long period of years, further agreed that the almost total lack of interest displayed by the undergraduate in the subject of orthodontia was appalling. Every man at the board appeared eager to talk and they were all equally as attentive when others were talking.

Children needing orthodontia treatment were classed in two groups: Those who can assume the financial obligations, those who cannot.

Of course many other groups might as well be formed for certainly there are those who think they can pay and cannot and vice versa. There are those who are informed and others not. Some think they need the service and want it, others are apparently indifferent. Children reared in homes surrounded with culture and affluence are often apparently unaware of the most complicated cases of malocclusion.

No one doubted the statement that there were not enough orthodontists to scarcely begin treating the cases that now need it. Of course no one questioned as to whether the rural children and the urban children alike, need the service. While it is at present impractical to contemplate gathering up the children to convey them to city orthodontists as they are being taken to schools in some localities, it is not altogether improbable in the future. Public clinics could not, even if accessible, solve the problem.

Prevention of malocclusion being the remotest hope, since there are no positive means of prevention, undoubtedly palliative measures that will lessen the severity in some cases offer the most attractive solution from that standpoint.

The general practitioner is not doing children's dentistry. Neither is he itching to do it. Few specialists are active in that field.

We are in one accord in the belief that if undergraduates were taught occlusion as a base of all dentistry; if they were taught technic uniformly to a certain point; and if they were compelled to show as much skill in the construction and adaptation of orthodontic appliances as they are in other departments; if they were required to serve in the orthodontic clinic and to gain actual experience treating cases with the simplest types of standard appliances, after having devoted some time to the consideration of etiology and diagnosis; and if they were given proper recognition for their attainments; many undergraduates would become infatuated with the work and lead more active lives in the realm of orthodontic research.

ORTHODONTIC NEWS AND NOTES

American Society of Orthodontists

The next annual meeting of the American Society of Orthodontists will be held April 30, May 1, 2 and 3, 1928, at the Hotel Statler, Buffalo, New York. Members in good standing in the American Dental Association are cordially invited to attend.

Walter H. Ellis, President; Charles R. Baker, Sec'y-Treas. 708 Church Street, Evanston, Ill.

Federation of American Women Dentists

The sixth annual meeting of the Federation of American Women Dentists will be held in Detroit, Mich., October 24, 1927. Women members of the American Dental Association welcome.

Grace Rogers Spalding, President; 423 Maple Avenue, West Birmingham, Mich. Mary B. Meade, Sec'y; Carmi, Illinois.

The First District Dental Society

The First District Dental Society announces its third *Better Dentistry Meeting* to be held at the Hotel Pennsylvania, New York City, December 5, 6 and 7, 1927.

In conjunction with this meeting a dinner will be tendered Dr. William Dwight Tracy in recognition of his contribution and unselfish devotion to the profession.

Detailed information will be published at a later date.

American Association of Dental Schools

The fifth annual meeting of the American Association of Dental Schools will be held at the Mayflower, Washington, D. C., March 26, 27 and 28, 1928. DeLos L. Hill, Secretary, 1206 Medical Arts Building, Atlanta, Ga.

Notes of Interest

Dr. Harvey Stallard announces the removal of his orthodontic office from 247 Spreckles Theatre Building to Suite 803 Medico-Dental Building, Corner Third and A Streets, San Diego, Calif.

Dr. E. Santley Butler announces the removal of his office to 55 Locust Avenue, New Rochelle, New York, and at 576 Fifth Avenue, New York, N. Y. Practice limited to orthodontia.

Dr. C. Sterling Conover announces the removal of his office to 5 East 57th Street, New York City.

Dr. Bernhard Wolf Weinberger announces the removal of his office to 119 West 57th Street, New York City. Practice limited to orthodontia.

Dr. Ira A. Lehman announces the removal of his offices from 1329 to Suite 1123, The David Whitney Building, Detroit, Mich.

Dr. William F. Martin announces the removal of his offices from 452 East Twenty-Second Street to 417 Medical Arts Building, Cathedral and Richmond Streets, Baltimore, Md.

Dr. L. R. Sattler announces the opening of his office at 1202 Hollingsworth Building, Sixth and Hill Streets, Los Angeles, California. Practice limited to orthodontia.

Dr. H. Colton Bliss announces the opening of an office at 160 Bloor Street West, Toronto, Canada. Practice limited to orthodontia.

Dr. Willis H. Grinnell wishes to announce to his friends of the dental profession the opening of his office at 19 Bay State Road, Boston, Mass. Practice limited to orthodontia.

Dr. R. G. Hutchinson, Jr., announces the removal of his office to the Transportation Building, 225 Broadway, New York City. Practice limited to periodontia and oral diagnosis.

Dr. Charles F. Bowles announces the opening of his office at 704 Professional Building, Richmond, Va. Practice limited to orthodontia.

Dr. Walter E. Lipscomb announces his return from a year spent in graduate study at the University of Pennsylvania with Dr. A. LeRoy Johnson and the removal of his offices to 1216-17 Medical Arts Building, Houston, Texas. Practice limited to orthodontia.

Dr. William H. Lewis announces the opening of his office for the exclusive practice of orthodontia, 301 Union Trust Building, Petersburg, Virginia.

Dr. Forte K. Rabb announces the removal of his office from 1115 Southern Finance Corporation Building to 512 and 513 Marion Building, Augusta, Georgia. Practice limited to orthodontia.